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THE CONDOR

VOLUME 49

MAY-JUNE, 1947

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EXOTIC EGGS IN NESTS OF CALIFORNIA GULLS

By JOHN W. SUGDEN

Exotic or foreign eggs in the nests of California Gulls (*Larus californicus*) have been found so often in so many different nesting colonies and under such conditions that it has become obvious that their occurrence can be ascribed neither to mere chance or accident nor to misplaced laying nor to parasitism. The observations reported here point to a possible explanation. Although the gull colonies listed have been visited many times, exotic eggs were not noted prior to 1944.

Record of Nests

No.	Locality	Date	Exotic egg	California Gull
1.	Rock Island, Utah Lake, Utah	May 26, 1945	Pheasant	2 eggs
2.		May 28, 1944	Pheasant	2 eggs, 1 young
3.			Pheasant	2 eggs
4.			Pheasant	2 eggs
5.			Pheasant	2 eggs
6.	Farmington Bay Refuge, Utah		Coot	2 eggs
7.		May 12, 1946	Shoveller	3 eggs
8.		May 19, 1946	Pheasant	3 eggs
9.			Pheasant	2 young
10.			Pheasant	1 egg, 2 young
11.			Cinnamon Teal	3 young
12.			Coot	2 eggs
13.	Bear River Refuge, Utah		Coot	2 eggs

Of the 13 exotic eggs found in gull nests, 8 belonged to the Ring-necked Pheasant (*Phasianus colchicus*), 3 to the American Coot (*Fulica americana*), 1 to the Cinnamon Teal (*Querquedula cyanoptera*), and 1 to the Shoveller (*Spatula clypeata*). In no instance did any of the birds whose eggs were found in the gull nests inhabit the area of the gull nesting colony. Sometimes nests of Cinnamon Teal or other ducks are found in the vicinity of gull nests, but there was no indication that they were nesting in the areas at the times these records were made. No acceptable nesting sites for pheasants or coots were in the vicinities of the colonies.

Gull nesting colonies in Utah are nearly all on islands and occasionally are on dikes or peninsulas where water almost surrounds the nesting area. The colony on Rock Island in Utah Lake is situated on a small island which varies in area depending upon the water level of the lake. In the years 1944 and 1945, the island was small because of the high water level and the gulls occupied nearly all the island. There were no pheasants or coots on the island and the nearest nesting place for them was in the marshes of the east shore of the lake, several miles from the island.

The gull colonies at the Farmington Bay Refuge are situated on artificial islands made from dredgings within the flooded areas where the water was impounded by dikes.

These islands are nearly bare, having only a sparse vegetative covering of mineral weeds, and no pheasants or coots have nested on the islands. Both, however, might nest in the marsh edges within a mile or two of the islands. In past years, an occasional duck has nested on the islands, but recently, only gulls have occupied the sites.

The gull colonies at Bear River Refuge are situated on a dike two or three rods in width between units 3 and 4. There is a sparse surface vegetation, water on either side of the dike, and some marsh vegetation at a distance in the units. Near the end of the dike, in 1946, there was a colony of Avocets with nests containing eggs or newly hatched young. No Avocet eggs were found in any of the gull nests. Two Canada Goose nests, one occupied and one deserted, were near the edges of the gull colony. Pheasants,



Fig. 17. California Gull nest with three gull eggs and a pheasant egg. Bear River Marshes, Utah, May 19, 1946.

coots and ducks were nesting in the marshes beyond the water, but none was on the dike.

Although ducks have occasionally nested on Rock Island and the islands of Farmington Bay Refuge, it is certain that they were not nesting in these places in 1945 and 1946.

Never more than one foreign egg has been found per gull nest, and in all instances the foreign eggs were unincubated and were either fresh or in various stages of decomposition. Those eggs found in nests where the young had hatched were markedly nest stained and were covered with debris, indicating that they had been in the nest during the period of incubation, although probably the young birds had added to the stain. In one nest on Rock Island, a pheasant egg had about half of a shell of another egg covering one end and securely attached by the dried egg albumen. The fit was so even that the general egg outline was not greatly disturbed.

The presence of these exotic eggs in gull nests cannot be interpreted as true parasitism as practiced by the cowbirds, European Cuckoo and other birds of similar habits. Nor is it comparable to the misplacement of eggs, as in the Mallard, Redhead and Ruddy Duck, which sometimes deposit several eggs in the wrong nest. Composite nests of ducks have been found in which two different females of either the same species or different species have laid their eggs in the same nest. Mixed or "dump" nests have been found

in which large numbers of duck eggs of more than one species have been deposited without any female assuming responsibility for the nest and with subsequent lack of downing and incubation.

Occasionally, gulls themselves deposit eggs in the wrong nest and sometimes nests are found containing an egg that more nearly resembles the eggs of a nearby nest than its mates and which has been accepted as part of the complement. This may be ex-



Fig. 18. California Gull nest with two gull eggs and a coot egg. Bear River Marshes, Utah, May 19, 1946.



Fig. 19. Avocet nest with six normal eggs and a runt egg. Bear River Marshes, May 9, 1923.

plained on the basis of mistaken identity of nest or territory. John B. Van den Akker informs me that he has found Forster Tern eggs in gull nests, presumably deposited by terns from a nearby colony. These examples, however, may be explained on a similar basis to that of the foreign pheasant, coot and duck eggs.

Apparently the shape of the egg is more important in determining the acceptance of an object in the nest than the size and color. It has been shown by McClure (1945)

that Mourning Doves will accept and incubate their eggs regardless of the color that they have been painted. Western Willet eggs have been accepted in Long-billed Curlew nests and visa versa in areas where the two species nest in similar habitats. In this instance, the eggs were similar in coloration but not in size. Runt eggs are usually accepted in the nest and may even be left by two birds using a composite nest, as was true once in an Avocet nest containing six eggs and a small runt (fig. 19).

In areas where Avocets nest in gravel, round pebbles have been found among the eggs and have been accepted by the bird as part of the set. Sometimes other odd shaped objects of about the same general size may be accepted by incubating birds. A. O. Treganza found a ball in a gull's nest on Hat Island, Great Salt Lake.

The circumstances indicate that the exotic eggs here recorded have been obtained by the California Gulls and have been transported to their nests. The actual carrying of eggs to the nest has not been observed, but Stephen J. Terry states that he has seen California Gulls raid pheasant nests at the state game farm at Springville, Utah, and carry eggs to adjacent fields before they would alight to eat them. These eggs were carried in the bill of the gull. Objects as large as coot, pheasant or duck eggs can be carried by gulls. One gull was seen to alight on the fairway of the Salt Lake Country Club, grasp a golf ball in its bill and fly away. Dr. L. D. Pfouts of Payson, Utah, believes that pheasant eggs are swallowed by the gull and regurgitated, but he has never witnessed the procedure and the process may be questioned. Other birds have been suspected of, or observed in the act of carrying eggs. Lindsey (1946:491) states that there is either "direct observation or strong evidence of ducks transporting eggs away when deserting [the nest] or [when] very nervous." Hochbaum (1944:92) reports that on two occasions local guides told him "that they have seen Mallard hens carrying eggs in their bills." Also, he watched a female Shoveller which passed within thirty yards of him and which "was carrying an egg between the upper and lower mandibles, the egg being held near the tip of the bill."

It is well known that gulls raid other nests and take eggs for food. That they carry them home to their own nests instead of eating them may be due to hormonal influences exerted during the height of the breeding cycle. Fosdick (1936:29-30) has mentioned the complete change in attitude and disposition of a rat which at first is completely oblivious to offspring offered her for adoption but which after stimulation by injections of prolactin (a pituitary hormone) eagerly mothers as many young as may be placed in the cage with her. She will cherish not only infants of her own species but infant mice, rabbits or even squabs. The same hormone has been shown by Riddle, *et al.* (1935) to induce broodiness in fowls. In all probability, the gulls have raided nests for food and have carried the eggs back to their own nests preparatory to eating them. The nesting impulses then have overpowered the feeding impulse so that the exotic eggs become component parts of the nests, rather than objects of food.

LITERATURE CITED

- Fosdick, R. B.
1936. President's review. The Rockefeller Foundation Annual Report for 1936:3-60.
Hochbaum, H. A.
1944. The canvasback on a prairie marsh (Washington, American Wildlife Institute), xii+201 pp.
Lindsey, A. A.
1946. The nesting of the New Mexican duck. *Auk*, 63:483-492.
McClure, H. E.
1945. Reaction of the mourning dove to colored eggs. *Auk*, 62:270-272.
Riddle, O., Bates, R. W., and Lahr, E. L.
1935. Prolactin induces broodiness in fowl. *Amer. Jour. Physiol.*, 111:352-360.
Department of Ornithology, University of Utah, January 24, 1947.

A SYNOPSIS OF THE SAVANNAH SPARROWS OF
NORTHWESTERN MEXICO

By A. J. VAN ROSSEM

Along the Pacific coast of Baja California from the international boundary south to Magdalena Bay, on the San Benito Islands, and on the coast of northwestern Mexico from the mouth of the Colorado River south to Sinaloa, there exists a series of populations of the Savannah Sparrow (*Passerculus sandwichensis*) which are separated ecologically from those of the interior of the continent. The habitat of this group, save for two instances of insular adaptation, is rather rigidly restricted to tidal marshes, a fact long recognized and reflected in past vernacular usage of the name "Marsh Sparrow." Because of environmental limitations, distribution is not continuous and through the same circumstance the transition from one population to another tends at times to be more abrupt in one or more characters than otherwise would be the case. This abruptness is expressed in the nomenclature of only a few years ago, as witness the binomials *Passerculus beldingi*, *Passerculus rostratus*, and *Passerculus guttatus*.

Considerations which have altered the concept of closely related but distinct species are the discovery of geographically intergrading populations in some cases and breakdown of supposed specific characters through individual variation in others. There now is no valid reason to dispute the revaluation of these initially conceived species as geographical variants of the continent-wide Savannah Sparrow, *Passerculus sandwichensis*. Such revaluation is not novel. It has been advocated at various times in the past and if re-affirmed here it is only because of relatively recent protest (Grinnell, Condor, 41, 1939:112-119) which would urge retention of the name *rostratus* in a specific sense for the largest-billed members of the group. There admittedly is something to be said in favor of such distinction and if I disagree it is only because definite intergradation of all characters is shown to exist.

The confusion in the nomenclature of this group has been due largely to past complications surrounding *Passerculus guttatus*, the name given by Lawrence eighty years ago to an olive-gray, moderately large-billed sparrow taken in winter at San José del Cabo. This locality is outside the breeding range of any Savannah Sparrow but is one where several races are to be found in winter. For the moment it need only be mentioned that the name *guttatus* has been used at one time or another for the breeding populations of an unknown, provisional area, of San Ignacio Lagoon, of the San Benito Islands, of the mouth of the Colorado River, and even, tentatively, of the coast of southern Sonora. It was uncertainty as to the application of this name which admittedly caused Peters and Griscom (Bull. Mus. Comp. Zool., 80, 1938:474-477) to omit detailed consideration of the large-billed group in their recent revision of the Savannah Sparrows, although they did deal with the northernmost member, *beldingi*.

Paradoxically, there has been substantial agreement as to the number of forms to be recognized. The confusion has been largely a matter of nomenclature, the keystone to which is, as already observed, proper application of the name *guttatus*. Failure to reach accord on this point has been due to one or another of several causes, probably the most important of which have been the lack of adequate, known, breeding material by which to determine and evaluate critical morphological characters and failure to recognize the fact that some, and possibly all, races exhibit a gray manifestation or even an extreme gray phase in addition to the "normal" coloration. Additionally, it seems to have been

generally overlooked that the females of some races, most especially and particularly those of the migratory, Colorado delta race *rostratus*, average darker and grayer and possess smaller and relatively more slender bills than males. Finally, the suggestion of the existence of possibly radically different winter and summer plumages has proved to be without basis, since aside from loss of edgings through wear, the basic colors and patterns persist throughout the year.

In the following synopsis an attempt is made to outline what appears to me to be the proper arrangement of the "large-billed" group of Savannah Sparrows. At this place I wish to acknowledge the plate made for me as a personal favor by my friend George Miksch Sutton, for it illustrates far better than any words the extraordinary degree of subspeciation which has occurred among the Savannah Sparrows within the limited region under consideration.

THE BELDINGI GROUP OF RACES

The two races of the *beldingi* group occur, within the scope of this paper, from the international boundary south along the Pacific coast of Baja California to Scammon Lagoon. The group is characterized by a strong color pattern with the upper parts streaked with contrasting black, browns, and buffs and under parts prominently streaked with black or brownish black. Normally, there is a certain amount of yellowish suffusion which affects chiefly the head but which in extreme cases is apparent over most of the body plumage and may even tinge the white of the under parts. The superciliary streak is normally strongly yellow at all seasons. An extreme gray phase which results in a substantially gray, black, and white plumage occurs at times. Additionally, a certain proportion of individuals shows varying reduction of the buffy or brown elements. Aside from this individual variation, which is marked, there is little which I can associate with age or sex although first-year birds tend to average more buffy or yellowish. Spring and summer birds are darker dorsally because of attrition of the light feather edgings with consequent emphasis of the black central streaking. Structurally, this group is a connecting link, through *P. s. beldingi*, with the more typical races of the "Savannah" Sparrow to the north and, through *P. s. anulus*, with the larger-billed races to the south. Both races are essentially non-migratory, although there is a limited local dispersal during the winter.

Passerculus sandwichensis beldingi Ridgway

Belding Savannah Sparrow

Passerculus beldingi Ridgway, Proc. U. S. Nat. Mus., 7, 1884 [Feb. 25, 1885]:516 (San Diego, California).

Subspecific characters.—Within the group characterized above, bill smaller both in length and depth than that of *Passerculus sandwichensis anulus* of Scammon Lagoon, and tail slightly longer than in that form. Compared with *Passerculus sandwichensis alaudinus* ["bryanti"] of the San Francisco Bay area of California, bill longer and more attenuated (less conical), and upper parts with black streaking less prominent.

Geographic range.—Resident on coastal marshes from Santa Barbara County, California, south along the coast of northwestern Baja California, including the Todos Santos Islands, to Rosario (lat. 30°).

This race is dichromatic in that a gray tendency or manifestation is present in many individuals. The extreme gray phase is not dissimilar in color to the essentially gray, black, and white *P. s. nevadensis* of the Great Basin but the shorter wing and tail, longer and larger bill, and broad ventral streaking of *beldingi* serve to distinguish such rare extremes without difficulty. It follows that individual variation in color is very pronounced in *beldingi* but a sharp, contrasting pattern is always present and in this feature *beldingi*, together with *anulus*, is well set off from the other races of northwestern

Mexico. As to color trends correlated with sex, there is a tendency in Ventura and Santa Barbara counties and on the Todos Santos Islands for males to be grayer and females to be browner, but elsewhere this seems not to be true. Geographical trends within the race are to be seen in a notable tendency toward the smaller bill of *alaudinus* in the northern part of the range and an increase in bill size combined with shorter tail which reflects an approach to *anulus* southward. As a matter of fact, most specimens from Baja California south of latitude 31° are so variously intermediate between *beldingi* and *anulus* that any name applied to them must be more or less arbitrary.

Specimens examined.—California, 94. Baja California, 35 (Ensenada, 1; Todos Santos Islands, 20; Colnett, 4; Mouth of San Telmo River, 1; San Quintín, 7; Socorro, 1; Rosario, 1).

Passerculus sandwichensis anulus Huey

Scammon Savannah Sparrow

Passerculus rostratus anulus Huey, Trans. San Diego Soc. Nat. Hist., 6, no. 10, Aug. 30, 1930: 204 (Scammon Lagoon, Lower California).

Subspecific characters.—Similar to *Passerculus sandwichensis beldingi* and not certainly distinguishable in color, although averaging lighter dorsally. Bill distinctly larger and longer, and tail shorter.

Geographic range.—Resident at Scammon Lagoon and the adjacent Santo Domingo Landing on the Pacific coast of central Baja California.

In the series at hand, which includes both breeding and winter specimens, the coloration is less variable than in *beldingi* and also averages a little lighter due to a reduction of black, central streaking dorsally. This distinction is minor, however, and discernible only in series. Males tend to have the dorsal pattern less sharp and more diffused than do females. This tendency is significant chiefly because of the approach it constitutes to the more decided sexual dichromatism found in some members of the *rostratus* complex. An extreme gray phase is represented by a single specimen, a female (no. 18495 San Diego Nat. Hist. Mus.) taken at Santo Domingo Landing, December 7, 1941, by L. M. Huey. This extreme manifestation is probably rare in *anulus* since the gray influence is not nearly so noticeable in series as in *beldingi*.

This race is a critical one since in bill size it is the link which connects the *beldingi* group with the *guttatus* group to the south. Seemingly it is resident, for no specimens which can be identified with it have been taken anywhere outside of the breeding area.

Specimens examined.—Baja California, 28 (Scammon Lagoon, 22; Santo Domingo Landing, 6).

THE GUTTATUS GROUP OF RACES

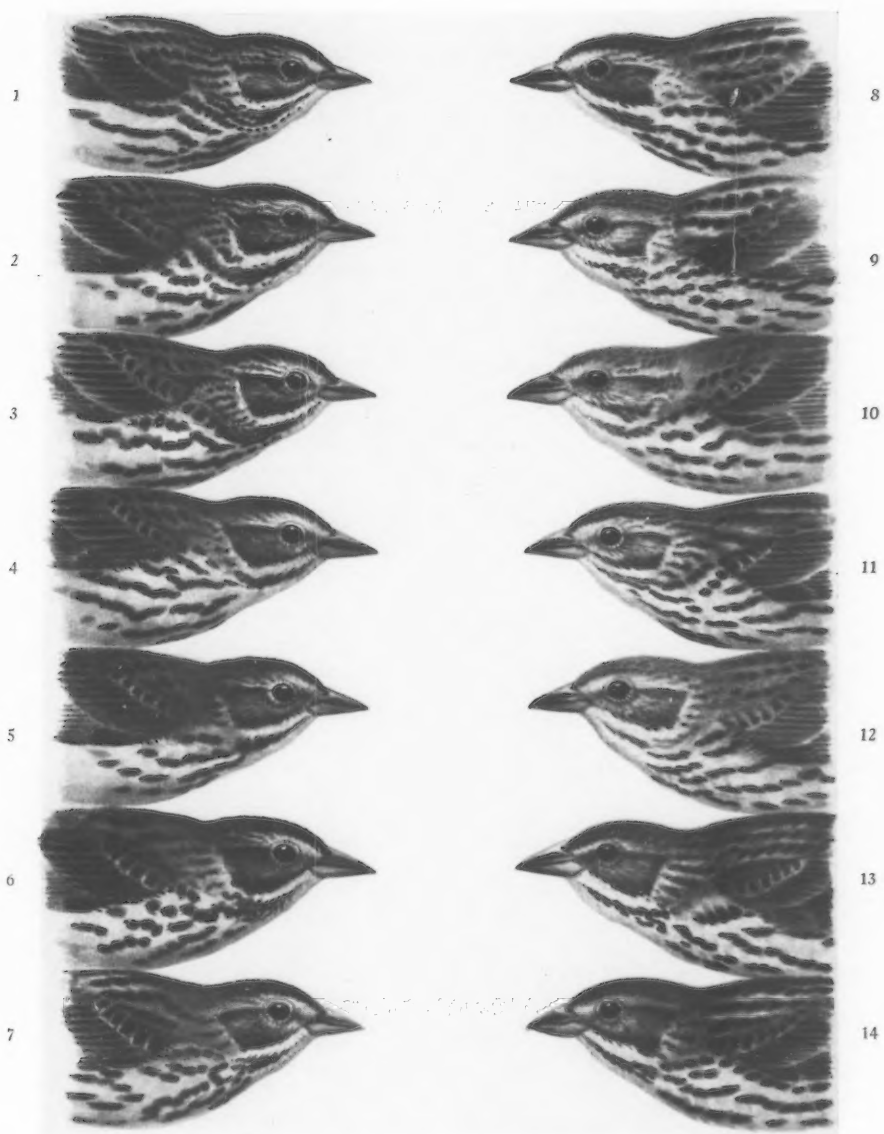
The *guttatus* group of two races occurs in the southern part of the peninsula from Pond and San Ignacio lagoons south to Magdalena Bay. It is distinct from *beldingi* and *anulus* in the notably diffused and blended character of the dorsal plumage with much less contrast between feather centers and edgings, even in fresh fall plumage. The color tone dorsally is prevaillingly olive, darker, grayer, and more diffused northwardly, and lighter, greener, and more contrasted in pattern southwardly. The superciliary streak is normally yellow at all seasons, although perhaps less strongly so than in *beldingi* and *anulus*. No extreme gray phase has been observed to date, although there is some individual variation in the relative degrees of gray, olive, or greenish olive present. In general size, members of the *guttatus* group are somewhat larger than those of the *beldingi* group. This is particularly true of the bill. However, through the northern member of the group (*guttatus*) there is complete structural intergradation with *anulus*, and to the south (through *magdalenae*) there is similar intergradation with the *rostratus* group. Both races are migratory only to the extent that some individuals occur southward to the Cape region in winter.

LEGEND

SAVANNAH SPARROWS OF NORTHWESTERN MEXICO

1. *Passerculus sandwichensis beldingi*.
Male, fall, San Diego, California, November 17, 1920. No. H-1165 Dickey Coll.
2. *Passerculus sandwichensis anulus*.
Male, fall, Santo Domingo Landing, Baja California, December 7, 1941. No. 18494 San Diego Nat. Hist. Mus.
3. *Passerculus sandwichensis anulus*.
Female, fall, gray, Santo Domingo Landing, Baja California, December 7, 1941. No. 18495 San Diego Nat. Hist. Mus.
4. *Passerculus sandwichensis guttatus*.
Male, spring, San Ignacio Lagoon, Baja California, March 26, 1927. No. 11345 San Diego Nat. Hist. Mus.
5. *Passerculus sandwichensis guttatus*.
Female, fall, Todos Santos, Baja California, September 17, 1924. No. 45156 Mus. Vert. Zool.
6. *Passerculus sandwichensis magdalenae*.
Male, spring, San Jorge, Baja California, April 23, 1931. No. 59974 Mus. Vert. Zool.
7. *Passerculus sandwichensis magdalenae*.
Female, fall, Todos Santos, Baja California, October 18, 1928. No. 55481 Mus. Vert. Zool.
8. *Passerculus sandwichensis sanctorum*.
Male, "fall," brown, San Benito Islands, Baja California, April 1, 1938. No. 19221 Los Angeles Mus.
9. *Passerculus sandwichensis sanctorum*.
Female, spring, gray, San Benito Islands, Baja California, February 19, 1930. No. 29972 Dickey Coll.
10. *Passerculus sandwichensis rostratus*.
Male, fall, red, San Diego, California, September 28, 1914. No. 9420 Dickey Coll.
11. *Passerculus sandwichensis rostratus*.
Female, spring, mouth of Colorado River, Sonora, April 23, 1925. No. 15210 Dickey Coll.
12. *Passerculus sandwichensis rostratus*.
Female, extreme gray, Angel de la Guarda Island, Baja California, January 6, 1932. No. 50312 Dickey Coll.
13. *Passerculus sandwichensis atratus*.
Male, spring, Tobari Bay, Sonora, May 1, 1930. No. 30308 Dickey Coll.
14. *Passerculus sandwichensis atratus*.
Male, fall, Todos Santos, Baja California, September 17, 1924. No. 45154 Mus. Vert. Zool.

All figures approximately three-fourths natural size.



SAVANNAH SPARROWS OF NORTHWESTERN MEXICO

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Passerculus sandwichensis guttatus Lawrence

Abreojos Savannah Sparrow

Passerculus guttatus Lawrence, Ann. Lyc. Nat. Hist. New York, 8, nos. 15-17, May, 1867:473 (San José [del Cabo], Lower California).

Ammodramus halophilus McGregor, Auk, 15, July, 1898:265 (Abreojos Point [= Pond Lagoon], Lower California).

Subspecific characters.—Compared with *Passerculus sandwichensis anulus* of Scammon Lagoon, bill averages decidedly larger, tail longer, and dorsal coloration distinctly dull, olivaceous gray with the pattern relatively inconspicuous and diffused instead of contrasted. Compared with *Passerculus sandwichensis magdalenae* of Magdalena Bay [postea], size averages smaller in all dimensions except for the slightly longer bill; coloration darker and more grayish (less greenish) olive, and dorsal pattern less conspicuously contrasted.

Geographic range.—Pond and San Ignacio lagoons on the Pacific coast of Baja California. Winters occasionally south to the Cape region.

The transition from *anulus* to *guttatus* is abrupt in coloration; indeed one's first impression when series of both races are observed is that distinct species are represented. However, individual extremes are to be found which completely bridge these differences; and this circumstance, combined with the marked overlap of all measurements, would seem sufficient to nullify any claim to specific distinctness.

The splendid breeding series of *guttatus* in the San Diego Natural History Museum, collected in March and April, has been the most critical of series examined in the present study. While most of the specimens exhibit wear, a few are still in only slightly abraded plumage and one or two show so little wear that the feathers of the limited anterior body molt of spring are scarcely discernible among the annual plumage. The neutral character of the dorsal coloration, that is to say, the relative absence of contrast between the dark olive feather centers and olive gray edgings, makes the differences between fresh and worn specimens of *guttatus* less than in any other race of the Savannah Sparrow.

The type of *Passerculus rostratus* has been sent to me through the courtesy of the United States National Museum. It is old number 17291, new number 26651 of that institution, taken at San José [del Cabo] in December [no date], 1859, by John Xantus. It is marked "♂" but this is certainly a mistake. No male sparrow measured by me in the present study has a wing measurement so short as the type save for a single *beldingi*. On the other hand, the wing length lies within the range of variation found in females of five out of the seven races here considered. Other measurements would seem to place the type beyond question as a female of the population of Pond and San Ignacio lagoons; in fact, taken in their entirety, these measurements can scarcely be associated otherwise. Additionally, the plumage is normal for the more grayish olive birds of that locality although this last factor would not in itself be conclusive in view of the observed color and pattern extremes of *rostratus* and of the San Benito Island race, *sanctorum*. Measurements, therefore, of adequate series of breeding birds have been the important and deciding factor. Brewster (Bull. Mus. Comp. Zool., 41, 1902:138-142), of course, correctly diagnosed the situation as long ago as 1902, and it is only to be regretted that other people, including myself, have found occasion to differ.

It seems evident that very few individuals of *guttatus* reach the Cape region in winter, for less than a dozen birds which are said to resemble closely the type of *guttatus* have been reported. At this time there are at hand three birds, in addition to the type, which can confidently be identified as *guttatus*. These are no. 18459, San Diego Natural History Museum, taken at San Jorge on November 22, 1941, by L. M. Huey; no. 45153, Museum of Vertebrate Zoology, taken at Todos Santos on September 8, 1924, by Chester

Lamb; no. 45156, Museum of Vertebrate Zoology, taken at the same locality by the same collector on September 21, 1924.

Specimens examined.—Baja California, 43 (San Ignacio Lagoon, 26; Pond Lagoon, 13; San Jorge, 1; Todos Santos, 2; San José del Cabo, 1, the type).

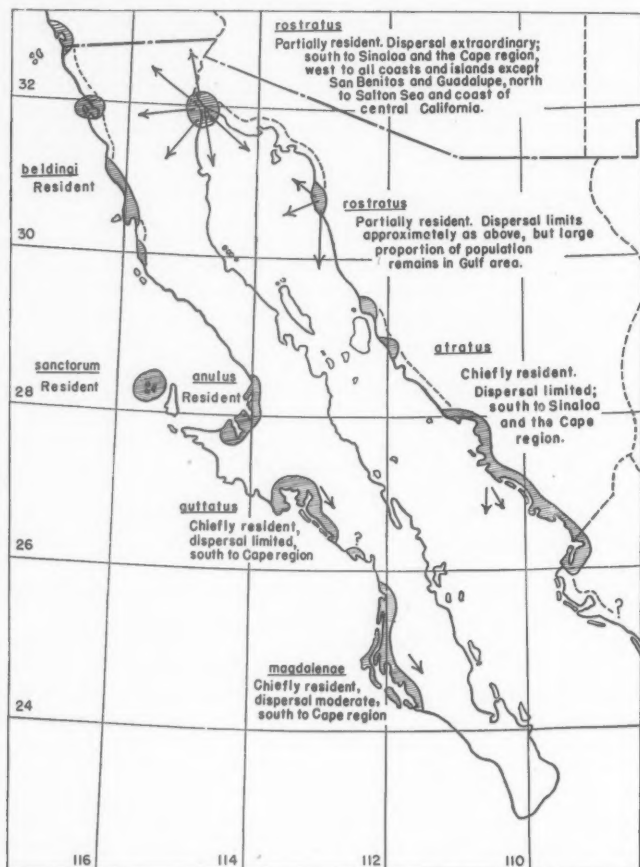


Fig. 20. Distribution of the races of Savannah Sparrow in northwestern Mexico. Shaded areas indicate breeding ranges; arrows show direction of dispersal in non-breeding season.

Passerculus sandwichensis magdalene new subspecies

Magdalena Savannah Sparrow

Type.—Adult male, nearing breeding condition, no. 29887, Dickey Collection; North Estero, Magdalena Bay, Baja California, March 4, 1930; collected by A. J. van Rossem.

Subspecific characters.—Coloration most nearly similar to that of *Passerculus sandwichensis guttatus* but lighter and more greenish (less grayish) olive; dorsal markings more prominent (less diffused) due to the lighter edgings. Size averages larger in all dimensions save for the bill which is slightly shorter and thicker at base; culmen outline more convex.

Geographic range.—Tidal marshes of Magdalena Bay and estuaries. Occurs, apparently in some numbers, south to the Cape region in winter.

This race is the culmination of the strongly yellow-browed, peninsular Savannah Sparrows with relatively slender bills which average less (usually much less) than 7.0 millimeters in depth at base. It forms a good connecting link between the smaller-billed, more northern *guttatus* and the larger-billed *rostratus* group of the continental mainland and the San Benito Islands in that it possesses the essential coloration of the former combined with the general large size of the latter.

To judge from the label names on the material examined at this time, it is safe to say that by far the greater number of specimens which have in the past been identified as "*halophilus*" when taken in winter in the Cape region are really *magdalenae*. I assume that *magdalenae* is for the most part resident, although the only winter date for that locality in the present material is January 28. Ten fall and winter specimens have been examined from localities south of the breeding area with dates ranging from September 11 at Todos Santos to January 20 at San José del Cabo.

Specimens examined.—Baja California, 30 (Magdalena Bay [San Jorge, 13; North Estero, 3; Santa Margarita Island, 3; "Magdalena Bay," 1]; Todos Santos, 9; San José del Cabo, 1).

THE ROSTRATUS GROUP OF RACES

The *rostratus* group occurs on the coast of northwestern Mexico from the mouth of the Colorado River south to Sinaloa, and on the San Benito Islands off the west coast of Baja California. It is characterized by a large, gross bill which averages over (usually well over) 7.0 millimeters in depth at base and with culmen outline varying from straight to strongly convex. The supraloral streak is normally only faintly yellow or yellow may be absent at any season. Coloration is extremely variable; dorsally it is prevalingly grayish, grayish brown, pinkish to pale rufescent brown, chestnut brown, or fuscous brown with moderately variegated dorsum in distinction to the bright, contrasting colors and pattern of *beldingi* and *anulus*, or to the diffused olive or greenish olive tones of *guttatus* and *magdalenae*. Ventral streaking varies in width but usually corresponds with the upper parts in color. This group is difficult to define other than as above, for in pale and dark as well as in red and gray extremes there is a wider variation than in any of the foregoing groups. It is equally varied in migratory habits; one is resident, the movements of another are imperfectly known but probably are limited, while the third has an extraordinary radial dispersal or migration for hundreds of miles north, west, and south from the breeding area. The three races are as follows.

Passerculus sandwichensis sanctorum Ridgway

San Benito Savannah Sparrow

Passerculus sanctorum "Coes" Ridgway, Proc. U. S. Nat. Mus., 5, April 3, 1883:538 (Island of San Benito, Pacific coast of Lower California).

Subspecific characters.—Bill large, stout, and deep at base as in *Passerculus sandwichensis rostratus* and *Passerculus sandwichensis atratus*, but culmen outline normally straight or nearly so rather than convex. Tarsi slightly shorter than in those races, but notably stout and, together with the feet, horn color or plumbeous brown rather than flesh color or light brown, a distinction which persists in most dried specimens. Wing slightly shorter and tail decidedly so, the latter relatively as well as actually. Dorsal pattern moderately variegated or contrasted as in *rostratus* and *atratus*, but differs in the presence of a more or less extensive intermixture of light gray or grayish white edgings in the interscapular area. Brown phase with tones tending to chestnut rather than pinkish. Ventral streaking relatively narrow as in *rostratus* but black, or nearly so, instead of brown.

Geographic range.—Resident on the San Benito Islands off the west coast of Baja California.

There has been considerable misapprehension about *sanctorum*, both as to distinguishing characters and migratory habits (see Oberholser, Ohio Jour. Sci., 19, 1919: 344-354). The chief cause of error concerning migration is that darker and grayer ex-

amples of the migratory *rostratus* often resemble *sanctorum* in general appearance, and it is such birds which have so often been identified as belonging to the island race. I have examined many which have been so determined in local and other collections and have yet to find one which has all, or even the majority of the distinctive characters of *sanctorum*. Under the circumstances, the population from the San Benito Islands must be assumed to be strictly resident until proven otherwise.

Both grayish and brownish manifestations are present but no extreme phase has been noted. The gray tendency is overwhelmingly dominant in the ratio of slightly better than three to one in the eighty specimens, including juveniles, examined at this time. It is appropriate to mention that age is not a consideration, for the two types are as obvious in the juvenal plumage as in mature birds. Neither does there seem to be a color trend correlated with sex as there is in *rostratus*.

The habitat of *sanctorum* is very unlike that of any of the other races here considered except for the colony of *beldingi* on the Todos Santos Islands. In the utter absence of marsh growth on these rocky, semi-desert islands the birds have adapted themselves to a setting in which one might reasonably expect the absent Black-throated Sparrow, but one which it is difficult to envision as an environment suitable for a populous colony of Savannah Sparrows. A further adjustment is reflected in the very early breeding season which commences, in common with other land birds of the San Benito Islands, in the latter part of February or even, possibly, in January, for fully plumaged postjuveniles are to be found as early as April 1. Such adaptability makes all the more perplexing the total absence of breeding colonies of this species on numerous other and seemingly much more suitable islands and its absence also from the entire Gulf coast of the peninsula.

The obviously close relationship of *sanctorum*, *rostratus*, and *atratus* can easily lead to the speculation that the colony on the San Benito Islands is a remnant population. At any rate, it is obvious that the three are more closely interrelated than are any of them to the present-day occupants of the intervening peninsula.

Specimens examined.—San Benito Islands, 80 (West island, 69; East island, 11).

Passerculus sandwichensis rostratus (Cassin)

Large-billed Savannah Sparrow

Emberiza rostrata Cassin, Proc. Acad. Nat. Sci. Philadelphia, 6, "October" [= November 11], 1852:184 (San Diego, California).

Subspecific characters.—Differs from *Passerculus sandwichensis sanctorum* in convex rather than straight outline of culmen, longer tail, and longer, flesh-colored or light brown tarsi. Plumage coloration varied, but usually with a definite pinkish or reddish tone pervading the gray of the entire upper parts and the streaking of the under parts. From the "normal" coloration, as above, there are endless variations which reach a pale gray at one extreme and a pale rufescent or brick red at the other. There is also a wide latitude in lightness or darkness of tone. Additionally, females average darker and grayer than males and also are more prominently streaked on the dorsum. Differs from *Passerculus sandwichensis atratus* of southern Sonora in much paler (less fuscous) and more varied coloration and narrower ventral streaking.

Geographic range.—Tidal marshes from the mouth of the Colorado River south along the coast of Sonora to Puerto Lobos at latitude 29° 54'. Disperses in fall, winter, and spring south at least to northern Sinaloa and Cape San Lucas, west to most and probably all islands in the Gulf, the shores of the entire peninsula of Baja California and its Pacific coast islands except the San Benitos and Guadalupe, and north in California to the Salton Sea in the interior and to Santa Cruz County along the coast.

Sexual dichromatism as well as individual variation is more in evidence in *rostratus* than in any other Savannah Sparrow under consideration here. A decided majority of the males possess a coloration which falls variously between numbers 10 and 11 of the

accompanying plate. Most females approximate number 11, with some overlapping into "male" coloration and others tending in varying degree toward the pale gray extreme of number 12. Further, as stated above, the interscapular region is more prominently streaked in females than in males, although here, too, some individual variation is apparent. A further variation which is geographical in nature is that in the colony at Puerto Lobos wherein a darkening in the average coloration of both sexes indicates an approach to *atratus*. The males of this colony tend to approximate number 11, while the females are slightly darker.

It is birds of the type found at Puerto Lobos, from whatever geographical source, which have provided records of the so-called "San Benito Sparrow" (usually under the equally incorrect name of "*guttatus*") from localities away from those islands. Possibly because of the more southward location of Puerto Lobos, it appears that the chief wintering ground of this colony, or at least of birds which resemble them, is in the Gulf. By this I do not mean that widespread dispersal does not take place, for it certainly does and probably reaches quite to the periphery of "typical" *rostratus*. A breakdown of the fall, winter, and early spring specimens in the Dickey Collection gives the proportions listed below. It is not possible to be exact, and several have been assigned arbitrarily. Further, the ratio for southern California does not reflect actual conditions because of the intentional emphasis on the collecting of gray birds. The other areas represent "run-of-the-mill" collecting.

	Reddish	Grayish
Gulf coasts and islands	38 specimens	33 specimens
Pacific coast and islands of Baja California	22	8
Coast and islands of southern California	53	21
Salton Sea, interior southern California	2	0

The route by which the Large-billed Savannah Sparrow reaches the Pacific coast is still problematical. An eight hundred mile, southward journey around Cape San Lucas as a preliminary before proceeding north for an equal or greater distance hardly seems likely. On the other hand the few records from the lower Colorado River in California and Arizona and at Salton Sea are the only instances of occurrence, anywhere, away from the maritime littoral.

Specimens examined.—Southern California, approximately 250; Sonora, 53 (Montague Island and adjacent shore, 16; Punta Peñascosa, 7; Puerto Lobos, 13; Puerto Libertad, 5; Tepopa Bay, 5; Patos Island, 1; Tiburón Island, 2; Kino Bay, 2; Pelicano Island, 1; San José de Guaymas, 1); Sinaloa, 2 (Isla de los Burros, 2); Baja California, 54 (Angel de la Guarda Island, 10; Angeles Bay, 1; San Lorenzo Island, 1; San Francisco Island, 1; San José Island, 5; La Paz, 1; Todos Santos, 12; Magdalena Bay, 3; Natividad Island, 10; Port San Bartolomé, 7; Cedros Island, 2; San Ignacio Lagoon, 1).

Passerculus sandwichensis atratus van Rossem

Sonora Savannah Sparrow

Passerculus sandwichensis atratus van Rossem, Trans. San Diego Soc. Nat. Hist., 6, no. 14, Nov. 28, 1930:218 (Tóbari Bay, Sonora, Mexico).

Subspecific characters.—Similar in size and proportions to *Passerculus sandwichensis rostratus* but averages slightly larger in all dimensions. Coloration grayer and much darker, the central streaking on dorsal feathers fuscous black; ventral streaking wider, and black rather than brown, reddish, or gray.

Geographic range.—Tidal marshes of the coast of central and southern Sonora at least to the Sonora-Sinaloa boundary. Winter range imperfectly known, although some individuals occur at various points in the breeding range at that season. Found also, perhaps only irregularly, in the Cape region of Baja California.

Specimens from the northern part of the range show marked approach to *rostratus*; in fact, the paler extremes, and particularly the females, from Tepopa and Kino bays

Table 1

Extreme and Average Measurements of Males in Millimeters

Wing	Tail	Culmen	Depth	Tarsus	Middle toe
Twenty-five <i>beldingi</i> from San Diego County, California					
64.0 (66.5)	69.0 46.0 (48.3)	51.0 11.3 (11.8)	12.5 5.6 (5.9)	6.5 19.5 (20.5)	21.3 15.0 (15.7)
Twenty-five <i>beldingi</i> from northern Baja California					
62.5 (65.6)	67.5 44.0 (46.2)	48.0 11.7 (12.1)	12.8 5.8 (6.2)	6.7 19.8 (20.7)	21.6 14.9 (15.6)
Sixteen <i>anulus</i> from Scammon Lagoon					
64.5 (66.7)	68.0 44.0 (45.7)	48.0 11.8 (12.4)	12.9 6.1 (6.3)	6.7 20.0 (21.1)	21.8 15.8 (16.1)
Twenty-seven <i>guttatus</i> from Pond and San Ignacio lagoons					
66.0 (68.2)	70.5 45.5 (49.9)	53.5 12.5 (13.2)	13.9 6.2 (6.6)	7.0 20.4 (21.4)	22.0 15.5 (16.3)
Sixteen <i>magdalenae</i> from Magdalena Bay					
66.5 (69.1)	70.5 48.5 (51.4)	53.5 12.2 (13.0)	13.8 6.4 (6.9)	7.5 21.8 (22.2)	22.8 16.4 (17.0)
Twenty-five <i>sanctorum</i> from the San Benito Islands					
66.5 (68.8)	71.0 46.5 (49.2)	52.0 13.1 (13.7)	14.7 7.0 (7.4)	7.8 20.5 (21.5)	22.1 16.0 (17.0)
Ten <i>rostratus</i> from the Colorado River delta					
69.5 (70.7)	73.5 49.5 (51.4)	55.0 13.0 (13.6)	14.2 6.8 (7.5)	8.1 21.9 (22.3)	23.1 16.0 (16.9)
Ten <i>rostratus</i> from the coast of northern Sonora					
66.0 (69.3)	71.5 49.0 (51.5)	54.0 12.8 (13.4)	14.1 7.2 (7.6)	8.2 21.3 (22.1)	22.6 16.3 (16.9)
Seventeen <i>atratus</i> from the coast of southern Sonora					
67.0 (70.0)	72.0 50.0 (52.8)	56.5 13.3 (13.8)	14.4 7.2 (7.6)	8.2 21.3 (22.0)	23.0 16.0 (16.9)

Measurements of Females in Millimeters

Wing	Tail	Culmen	Depth	Tarsus	Middle toe
Eighteen <i>beldingi</i> from San Diego County					
58.5 (61.7)	64.5 41.0 (43.9)	45.0 11.2 (11.6)	12.1 5.3 (5.6)	5.9 19.0 (19.6)	20.5 14.5 (15.2)
Nine <i>beldingi</i> from northern Baja California					
58.5 (61.2)	63.0 41.0 (43.4)	46.0 11.0 (11.5)	12.0 5.3 (5.8)	6.2 18.6 (19.4)	20.2 14.0 (15.0)
Twelve <i>anulus</i> from Scammon Lagoon and Santo Domingo Landing					
60.0 (62.3)	64.0 40.5 (44.0)	46.0 11.4 (12.1)	12.8 5.5 (6.0)	6.7 19.4 (20.5)	21.3 15.1 (15.9)
Twelve <i>guttatus</i> from Pond and San Ignacio lagoons					
62.0 (63.9)	65.5 45.0 (47.0)	48.0 12.6 (12.9)	13.2 5.9 (6.2)	6.5 19.5 (20.6)	21.2 15.0 (15.5)
Type of <i>guttatus</i>					
63.0	47.5	12.9	6.1	21.1	15.2
Four <i>magdalenae</i> from Magdalena Bay					
64.5 (65.5)	67.0 48.5 (49.0)	49.5 12.3 (12.6)	13.0 6.3 (6.4)	6.7 21.0 (21.5)	22.0 16.0 (16.5)
Twenty-two <i>sanctorum</i> from the San Benito Islands					
62.5 (64.2)	66.5 43.5 (45.6)	47.0 12.8 (13.4)	14.0 6.6 (7.1)	7.8 19.6 (20.6)	21.9 16.0 (16.5)
Seven <i>rostratus</i> from the Colorado River delta					
62.5 (66.3)	68.5 47.5 (48.8)	52.0 12.3 (13.0)	13.8 7.0 (7.2)	7.7 21.2 (21.4)	22.0 16.0 (16.3)
Eleven <i>rostratus</i> from the coast of northern Sonora					
63.5 (64.7)	66.5 46.5 (48.0)	49.0 12.8 (13.1)	13.6 6.7 (7.0)	7.2 19.6 (20.7)	21.6 15.6 (16.3)
Seven <i>atratus</i> from the coast of southern Sonora					
65.0 (66.2)	67.0 48.0 (50.0)	51.5 13.1 (13.4)	14.0 6.8 (7.2)	7.4 20.3 (21.1)	21.7 15.6 (16.1)

are not very much darker than *rostratus* from Puerto Lobos. There seems to be relatively little individual variation in *atratus*, in fact the series, aside from the extreme northern examples is surprisingly uniform in appearance. There is, however, the same marked sex difference seen in *rostratus* in the character of the interscapular streaking, the pattern of which is much more sharply defined and less diffused in females than in males.

The migrations or dispersals of *atratus* and their extent are at present imperfectly known. No winter specimens which possess characters of *atratus* in satisfactorily positive degree have been examined from localities outside the breeding range except for two individuals, birds of the year, taken at Todos Santos in the Cape region of Baja California on September 17 and 19, 1924, by Chester Lamb. These are now numbers 45154 and 45155, respectively, in the Museum of Vertebrate Zoology. Other specimens at hand

(all in the Dickey Collection) are one from Kino Bay, December 27, 1931, three from Patos Island, February 18, 1946, and one from Isla de los Burros, northern Sinaloa, March 12, 1946. This last locality, however, is probably within the breeding range. I also observed a few at Guaymas at various dates in February, 1946, where they appeared to be vastly outnumbered by wintering *rostratus*. At La Colorado at the mouth of the Fuerte River in northern Sinaloa, *atratus* appeared to outnumber *rostratus* so far as I could estimate visually, on March 15, 1946. Unfortunately, circumstances prevented collecting on both occasions. At this time it seems likely that *atratus*, in some measure at least, and perhaps for the most part, remains within the breeding range throughout the year.

Specimens examined.—Sonora, 39 (Tepopa Bay, 3; Patos Island, 3; Kino Bay, 11; Guaymas, 1; Viejo Yaqui Lagoon, 3; Tóbari Bay, 13; Agiabampo, 5). Sinaloa, 1 (Isla de los Burros, 1); Baja California, 2 (Todos Santos, 2).

MEASUREMENTS

The measurements in the accompanying table were taken from birds known, or with good reason believed, to have been on their nesting grounds. In the resident *beldingi*, *anulus*, and *sanctorum*, season has not been considered important although early spring birds have been used for the most part. Measurements of the migratory races *guttatus*, *magdalenae*, *rostratus*, and *atratus* are almost exclusively those of breeding birds collected at the beginning of the nesting season before any great amount of abrasion had occurred. An exception is the inclusion of some winter *rostratus* from the breeding area of that race at the mouth of the Colorado River because actual breeding birds were too few in number to provide reasonably accurate figures. Bill length has been taken from the tip to the edge of the skin covering the culmen near its base. Depth of bill has been taken from the edge of the skin on the mandibular ramus to the edge of the skin across the culmen.

ACKNOWLEDGEMENTS

I am indebted to the curators at the Los Angeles Museum, the Museum of Vertebrate Zoology, and the Natural History Museum of San Diego for the unrestricted use of specimens in their care and to those of the United States National Museum for the privilege of examining the type of *Passerculus guttatus*.

Dickey Collections, University of California, Los Angeles, California, February 10, 1947.

FOODS OF THE HAWAIIAN GOOSE

By PAUL H. BALDWIN

In a previous paper (Baldwin, 1945) the distribution and reduction in numbers of the Hawaiian Goose, or Nene (*Nesochen sandvicensis*), were described. In the present study, the food habits are considered as a step in the analysis of causes of the reduction of the population. Because of the practicability of obtaining material, this work is based mainly on the analysis of droppings.

We should attempt to learn whether or not food resources are a limiting factor in the success of the goose in its environment of today. Former writers have reported that seasonal changes in availability of food in the range of the Nene tend to cause it to shift about between uplands and lowlands at various seasons of the year. Also, availability of foods has been considered as decisive in influencing the area chosen for nesting.

The Hawaiian Goose is confined to the Island of Hawaii and inhabits barren lowland country from sea level to 3000 feet and upland slopes of the mountains, Mauna Loa and Hualalai, from 3000 to 9000 feet. Much of the range consists of barren lava flows which support only a scanty growth of herbs, ferns and shrubs and are entirely devoid of water. Other parts of the range include moist grasslands and open forests. The yearly rainfall in these areas falls between the probable limits of 15 and 120 inches. The lowland range is on the leeward side of the island, hence is hot and dry, whereas the upland range is more variable in climate.

The goose is a vegetarian, utilizing grasses, berries and herbs. The following plants have been mentioned by various authors as providing food: grasses, *Fragaria chiloensis* (white strawberry), *Rubus hawaiiensis* and *R. Macraei* (akala), *Vaccinium reticulatum* (ohelo), *Styphelia Tameiameia* (pukiaawe), *Solanum nodiflorum* (popolo), *Coprosma ernodeoides* (kukainene), and *Sonchus oleraceus* (sow thistle). It was agreed that the berries of *Vaccinium* are one of the most important foods. *Solanum* and *Sonchus* were also considered important.

The Nene went to the lower elevations in winter and spring to take advantage of the new growth of greens for rearing their young, according to Henshaw (1902:105). They returned to the uplands in summer where they fed on berries. Foods said to be abundant in the uplands in summer were grasses, *Vaccinium*, and other berries. These were less plentiful during the cold winter months. Abundant foods in the lowlands in winter were grasses, *Sonchus*, and other herbs. In spite of the scanty crop of berries in the uplands during winter, Peale (1848:250) found Nene subsisting on them in upland lava fields in November. In spring, grasses and *Sonchus* were said to continue abundant in the lowlands, and in late spring wild strawberries were obtainable in the mountains. In summer, strawberries continued to bear but went out of season around the end of July on Hualalai (Brigham, 1909:12). In the fall, berries of sorts were available.

Competition from grazing animals was thought by Pope (1932:110) to have been responsible for migration to the lowlands in winter, while Perkins pointed out that cattle destroy the strawberry plants in Nene range. Lamb (1937) suggested that pheasants are competitors of the Nene for foods.

Concerning differences between the food habits of the Nene and other species of geese, Miller (1937:3) points out that in comparison with winter flocks of geese in North America the Nene probably does less feeding on short grass and on grain growing on open level surfaces and appears to do no foraging in the mud at the edges of ponds and marshes.

The knowledge available as summarized above affords a meagre concept of the foods eaten. We find no detailed list of foods used, no mention of the chemical composition of foods or ecological aspects of the food supply. Nothing is said about the nutritional requirements of the geese themselves. In this study we attempt to supply some of this information, although the subject of the nutritional requirements of the geese could not be included.

Procedures.—Of 640 droppings collected, 543 were microscopically dissected. The material was gathered over a period of six years, between 1938 and 1944. In the field the droppings were readily recognizable. Except for some distinctly small droppings, presumably from juvenal birds, they were fairly uniform in size, and all were typically laminated at right angles to the long axis. A J-shape was characteristic. Mongoose droppings were similar in size but not in other features. Pheasant droppings were smaller, not laminated, and not frequently seen. The material varied from bleached to fresh.

Volumetric measurements of identified components were made by the water displacement method and by visual estimation. It proved possible to identify about 40 per cent of the material. Plant names used in the study are after Fagerlund and Mitchell (1944), and considerable data on the distribution of plants in Hawaii National Park were drawn from this work. The project was carried out on behalf of the United States National Park Service. The University of Hawaii kindly loaned a microscope for the work.

LIST OF FOODS

The following list of foods includes those actually identified in this study together with those attributed to the diet of the Nene by previous authors. A summary of foods actually found with data on the number of recorded occurrences, the per cent of occurrences, and the per cent of the total volume for each food is presented in table 1.

Agrostis avenacea. Grass.

Availability: Frequent along roadsides, Hawaii National Park (henceforth H. N. P.).

Use: Found in droppings from Kau Desert. Seeds, leaves, stems utilized.

Axonopus affinis. Narrow-leaved carpet-grass.

Availability: Abundant on grazed lands in Humuula (5800 ft.); abundant in moist pastures below 2000 ft. (Whitney, Hosaka, and Ripperton, 1939:26).

Use: Found in droppings from Humuula. Seeds, leaves, stems utilized.

Bidens.

Availability: Various species found from sea level to 7000 ft. on Mauna Loa in H. N. P.; greatest abundance in rather dry areas.

Use: Found in droppings from Mauna Loa in H. N. P. and Puuwaawaa. Seeds, leaves, stems utilized. Probably important in lowland areas.

Bulbostylis capillaris. Sedge.

Availability: Frequent on volcanic ash deposits in Kau Desert between 2000 and 4000 ft.

Use: Found in droppings from Kau Desert. A minute plant. Mainly seeds utilized.

Carex Macloviana. Sedge.

Availability: Frequent on slopes of Mauna Loa in H. N. P., from 4000 to 7000 ft.

Use: Found in droppings from Mauna Loa in H. N. P. and Humuula. Seeds utilized and probably the leaves also were frequently taken.

Carex wahuensis. Sedge.

Availability: Frequent in moderately wet areas in H. N. P. and occurring up to 10,000 feet on Mauna Loa; seen at summit of Hualalai.

Use: Found in droppings from Mauna Loa in H. N. P., Humuula, and summit of Hualalai. Seeds recovered and also green parts. Is one of the most important foods.

Carex. Sedge.

Use: Found in droppings from Humuula. Probably is *C. wahuensis*, but could not be specifically identified.

Cirsium vulgare. Common thistle.

Availability: Frequent in dry to moderately dry areas from the Kau Desert at 2000 to 6000 ft. on Mauna Loa in H. N. P.; found at summit of Hualalai and Puuwaawaa; where rainfall is less than 60 inches, at low and medium elevations.

Use: Found in only one dropping from Puuwaawaa. Seed feathers found. An important food.

Coprosma ernodeoides, var. *typica*. Kukainene.

Availability: Frequent in moderately wet areas from Kilauea up to about 8000 ft. on Mauna Loa in H. N. P.; abundant in Humuula; found at summit of Hualalai but not at lower elevations on Puuwaawaa where droppings were collected.

Use: Found in droppings from Mauna Loa in H. N. P. and Humuula. Fruits utilized. Perhaps not so important as previously thought.

Cyperus polystachyos. Sedge, kilioopu.

Availability: Abundant along roads and trails at Kilauea; frequent in Kau Desert; common in low altitude and occasional in medium altitude zones in Hawaii where rainfall is over 60 inches per year (Ripperton and Hosaka, 1942:48).

Use: Found only in droppings from the Kau Desert. Seeds and green parts utilized.

Deschampsia nubigena. Grass.

Availability: Frequent along roadsides about Kilauea and dominant on Mauna Loa slopes from 4000 to 7000 ft.; seen around 8000 ft. on Hualalai.

Use: Found in droppings from Mauna Loa (H. N. P., Humuula) and summit of Hualalai. Seeds, leaves, stems utilized. An important food.

Digitaria pruriens. Crabgrass.

Availability: Infrequent in moderately dry areas in H. N. P.; rather abundant on all the Hawaiian Islands in wet regions of the lowlands (Whitney, Hosaka, and Ripperton, 1939:54).

Use: Found in droppings from Kau Desert and abundantly in droppings from Puuwaawaa. Seeds and green parts utilized.

Digitaria violascens. Crabgrass.

Availability: Frequent in moderately dry areas in H. N. P.; fairly abundant in moist and semi-dry regions to an altitude of 5000 ft. or more (Whitney, Hosaka, and Ripperton, 1939:57).

Use: Found in droppings from Kau Desert (abundantly) and from Mauna Loa in H. N. P., Puuwaawaa, and Humuula. Seeds especially recovered, but green parts also found. An important food.

Festuca megalura. Foxtail fescue.

Availability: Of restricted occurrence in H. N. P. around 4000 ft.; found occasionally at medium altitudes in moist situations (Whitney, Hosaka, and Ripperton, 1939:72).

Use: Found in droppings from Mauna Loa in H. N. P. Seeds and green parts utilized.

Fragaria chiloensis. White strawberry.

Availability: Frequent in moderately wet forests of medium elevation; in H. N. P. found from perhaps 3000 to 6000 ft., abundant around 4000.

Use: Not recovered from droppings. Fruits utilized, according to various authors.

Gnaphalium sandwicense. Enaena.

Availability: Frequent in Kau Desert, also found on Mauna Loa in H. N. P. at 9000 ft.; found at summit of Hualalai; generally rare up to 4000 ft. in areas where rainfall is 40 to 60 inches (Ripperton and Hosaka, 1942:53).

Use: Found in droppings from Mauna Loa in H. N. P. and from summit of Hualalai. Leaves and flowers eaten. Perhaps important food at times.

Hypochaeris radicata. Gosmore.

Availability: Frequent to abundant in moderately dry areas from 2000 to 9500 ft. in H. N. P.; found at summit of Hualalai and at Puuwaawaa; generally common from 2500 to 7000 ft. where the rainfall is 40 to 60 inches or less and rare to occasional where the rainfall is more than 60 inches (Ripperton and Hosaka, 1942:53).

Use: Found abundantly in droppings from Mauna Loa in H. N. P. and from Humuula and Puuwaawaa. Seeds, leaves, stems, flowers utilized. Most important herb.

Luzula campestris. Rush.

Availability: Frequent around Kilauea and on Mauna Loa slope in H. N. P.

Use: Found in a single dropping from 7500 ft. on Mauna Loa. Only one seed covering was seen. An available but little utilized plant.

Oxalis corniculata. Lady's sorrel.

Availability: Frequent at Kilauea and rare on Mauna Loa in H. N. P. at 6250 ft.; rare at elevations from 2500 to 3000 ft., with rainfall of 20 to 40 inches, common in areas less than 2500 ft., rainfall 40 to 60 inches (Ripperton and Hosaka, 1942:54).

Use: Found in droppings from Mauna Loa in H. N. P. and from Puuwaawaa. Traces of seeds only.

Panicum tenuifolium. Mountain pili.

Availability: Frequent on Mauna Loa in H. N. P.; abundant at high altitudes on the island of Hawaii and able to grow in rather dry, windswept areas, where soil is rocky and shallow (Whitney, Hosaka, and Ripperton, 1939:91).

Use: Found in droppings from Mauna Loa in H. N. P. and from Humuula. Seeds and green parts utilized.

Physalis peruviana. Cape gooseberry, poha.

Availability: Infrequent from 4000 to 6000 ft. in H. N. P.; frequent at lower elevations in areas of about 30 to 60 inches of rainfall.

Use: Not recovered in droppings. As described later, a foraging Nene seemed to take something from poha vines.

Rubus hawaiiensis and *R. Macraei*. Hawaiian raspberry, akala.

Availability: Common to occasional in moderately wet to wet areas from 4000 to 7000 ft.; infrequent in H. N. P. on Mauna Loa slope from 4200 to 6500 ft.; seen at Puuwaawaa.

Use: Not found in droppings. These two species are listed as berry food plants by Pope (1932:110).

Rubus rosaefolius. Thimbleberry.

Availability: Frequent and widespread in wet and moderately wet forests and open grassy areas from sea level to 7000 ft., but not common above 5000 ft. in H. N. P. Only available in wettest parts of the Nene range.

Use: Found in droppings from Puuwaawaa. Fruits utilized.

Rumex acetosella. Sheep sorrel.

Availability: Frequent and widespread in H. N. P.; common in areas at elevations of 2500 to 4000 ft., and a rainfall of 40 to 60 inches (Ripperton and Hosaka, 1942:54).

Use: Found in droppings from Mauna Loa in H. N. P. and from Humuula. Mostly seeds found in droppings.

Silene gallica. Small-flowered catchfly.

Availability: Rare in moderately dry areas between 2000 and 3000 ft. in H. N. P.

Use: Found in droppings from Mauna Loa in H. N. P. and from the Kau Desert. Only seed cases showed up in the droppings. The number of occurrences was high (table 1).

Sisyrinchium acre. Mauulaili.

Availability: Frequent on Mauna Loa in H. N. P. around 6000 ft.; occasional to common from 4000 to 10,000 ft. in areas having 50 inches of rain or less and occasional in areas from 4000 to less than 7000 having 60 or more inches of rain (Ripperton and Hosaka, 1942:52).

Use: Found only in one dropping from 6250 ft., Mauna Loa in H. N. P. Several seeds were present. An available but unimportant food.

Solanum nodiflorum. Popolo.

Availability: Frequent from sea level to 4000 ft., and infrequent at higher elevations in dry to moderately wet areas in H. N. P.; not seen by the author at other upland places where droppings were collected but said to be common at elevations less than 2500 ft. where rainfall is 40 to 60 inches, and occasional up to 3000 ft. where the rainfall is 20 to 40 inches (Ripperton and Hosaka, 1942:55).

Use: Found in droppings from Mauna Loa in H. N. P. and Puuwaawaa. Seeds and skins of fruits recovered, indicating use of fruits. An important food.

Sonchus oleraceus. Sow thistle, pualele.

Availability: Common from sea level to 3000 ft., where the rainfall is less than 60 inches; occasional below 1500 ft. where rainfall is over 60 inches; in H. N. P. infrequent to frequent in moderately wet to dry areas from sea level to 4000 ft., rare up to 6250 ft.; absent from summit of Hualalai and Puuwaawaa at 4000 ft., where the writer collected droppings.

Use: Not found in droppings. Previously considered an important food plant. It undoubtedly is an important food plant in the lowlands, but apparently is not in the uplands because of low availability.

Sporobolus capensis. Rattail grass.

Availability: Abundant along roads and on grazed land in H. N. P.; seen at Puuwaawaa and Humuula; has become dominant over some of the range land in cool, moist areas and is abundant in open pasture land from low to medium altitudes (Whitney, Hosaka, and Ripperton, 1939:115).

Use: Found only in droppings from Puuwaawaa. Seeds only recovered from droppings. Although highly available, this grass seems to be rejected for the most part.

Styphelia Douglasii. Pukeawe.

Availability: Frequent to abundant on Mauna Loa at about 9000 ft.

Use: Found in droppings from Mauna Loa in H. N. P. Pits and leaves found. Indistinguishable from the following species in the droppings, except by leaf characters, so probably occurred more than recorded.

Styphelia Tameiameiae. Pukeawe.

Availability: Frequent to abundant from 2000 to 9000 ft. in H. N. P. in dry desert areas to moderately wet forests; characteristically in zones of rainfall of 40 to 60 inches per year or less (Ripperton and Hosaka, 1942:55).

Use: Found in droppings from Mauna Loa in H. N. P., Kau Desert and summit of Hualalai. Pits of fruit recovered almost entirely, indicating consumption of fruits. An important plant.

Vaccinium reticulatum. Ohelo.

Availability: Frequent to abundant from about 2800 to 8000 ft. in H. N. P. (Kau Desert, Kilauea, Mauna Loa); frequent on Mauna Loa lava flows in Humuula; frequent at summit of Hualalai and in saddle between Hualalai and Mauna Loa; generally absent below 2500 ft. A related species, *V. peleanum*, is abundant on Mauna Loa in H. N. P. from 8000 to 10,000 ft. and is probably indistinguishable from *V. reticulatum* in the droppings. Found in areas where rainfall is 30 to 60 inches per year.

Use: Found in droppings from Mauna Loa in H. N. P., Kau Desert, and the summit of Hualalai. Fruits utilized. An important food.

Verbena litoralis. Verbena.

Availability: Frequent about Kilauea and the middle slopes of Mauna Loa in H. N. P.; frequent in Humuula and at Puuwaawaa around 4000 ft.; occasional to common up to 6000 ft., where the rainfall is 20 to 60 inches per year.

Use: Found in droppings from Mauna Loa in H. N. P., Humuula, and Puuwaawaa. Seeds and green parts taken. A little used plant in view of its availability.

Moss.

Moss may or may not have been ingested by the goose. In some cases it was found growing on the droppings. Traces only found.

Lichen.

Lichens growing on lava rock frequently adhered to the droppings. In most cases they were ingested, however, as they were found within the droppings. Traces only found.

Arthropoda.

In two instances single fragments of arthropods were found. These may have been ingested accidentally with greens, fruits, or with clusters of seeds. In one case ohelo fruits were also present and in the other case, seeds, fruits, and leaves were present in the dropping. Animal life seems to play no part in the food habits of the adult goose as revealed in this study.

Chemical composition of the foods.—Eight of the more important foods were selected for chemical analysis in order that a more complete interpretation of the feeding habits of the Nene could be made. We are indebted to the staff of the laboratories of the Hawaii Agricultural Experiment Station at the University of Hawaii for performing the analyses. The proximate composition was determined by the Chemistry and Soils Department and the minerals and vitamins by the Nutrition Department.

Fresh samples of the foods in five-pound lots were sent to the laboratories in Honolulu via air express from Hilo, Hawaii. The foods were kept as cool as possible during the two days which elapsed between the picking and the start of the analyses. The name, date collected, source and part analyzed of each plant food is given in table 2.

Grass seeds are commonly broken up in the droppings, indicating utilization of the starchy and proteinaceous contents. Although *Deschampsia nubigena* and *Digitaria* were significant sources of grain among the grasses, they could not be obtained for analysis. *Carex wahuensis* with its rather large seed heads was important among the sedges, and the seeds were relatively rich in crude protein, fat (ether extract), and carbohydrate. They were also high in riboflavin and moderately so in thiamine. The values for these constituents are presented in table 3. *Hypochaeris radicata* and *Bidens* were the herbs whose seeds were most used. The seeds of the former were higher in calcium and phosphorous than any of the other principle foods analyzed. They were also moderately high in thiamine and riboflavin.

The most frequently recorded pulpy fruits were *Vaccinium reticulatum* and *Solanum nodiflorum*, which are juicy and have small seeds. The former was lowest in proteins, carbohydrates, crude fiber, ash, calcium, and phosphorous of all the foods tested. It was also very low in thiamine and riboflavin but very high in moisture content.

Table 1

Foods Found in 543 Hawaiian Goose Droppings

Name	Number of occurrences	Per cent of occurrences	Per cent of total volume	Average volume per individual dropping in per cent
Gramineae				
<i>Agrostis avenacea</i>	30	6	1.5	28
<i>Axonopus affinis</i> (narrow-leaved carpet-grass)	10	2	1.8	98
<i>Deschampsia nubigena</i>	111	20	8.3	41
<i>Digitaria pruriens</i> (crabgrass)	25	5	2.3	49
<i>Digitaria violascens</i> (crabgrass)	58	11	3.9	37
<i>Festuca megalura</i> (foxtail fescue)	16	3	0.9	32
<i>Panicum tenuifolium</i> (mountain pili)	31	6	1.3	23
<i>Sporobolus capensis</i> (rattail grass)	6	1	0.1	10
Cyperaceae				
<i>Bulbostylis capillaris</i> (sedge)	13	2	0.4	16
<i>Carex Macloviana</i> (sedge)	29	5	1.0	19
<i>Carex wahuensis</i> (sedge)	49	9	3.2	35
<i>Carex</i>	6	1	0.5	45
<i>Cyperus polystachyos</i> (sedge, kilioopu)	6	1	0.4	37
Juncaceae				
<i>Luzula campestris</i> (rush)	1	0.2	Tr.	....
Iridaceae				
<i>Sisyrinchium acre</i> (mauulaili)	1	0.2	Tr.	....
Polygonaceae				
<i>Rumex acetosella</i> (sheep sorrel)	23	4	0.5	12
Caryophyllaceae				
<i>Silene gallica</i> (small-flowered catchfly)	58	11	0.2	2
Rosaceae				
<i>Rubus roesaeifolius</i> (thimbleberry)	32	6	1.3	22
Oxalidaceae				
<i>Oxalis corniculata</i> (lady's sorrel)	3	0.6	Tr.	....
Ericaceae				
<i>Vaccinium reticulatum</i> (ohelo)	83	15	1.6	11
Epacridaceae				
<i>Styphelia Douglasii</i> (pukeawe)	3 ¹	0.6	Tr.	2
<i>Styphelia Tameiameiae</i> (pukeawe)	121	22	3.2	17
Verbenaceae				
<i>Verbena litoralis</i> (verbena)	17	3	0.2	5
Solanaceae				
<i>Solanum nodiflorum</i> (popolo)	51	9	1.5	6
Rubiaceae				
<i>Coprosma ernodeoides</i> (kukainene)	28	5	0.6	12
Compositae				
<i>Bidens</i>	14	3	1.7	68
<i>Cirsium vulgare</i> (common thistle)	1	0.2	Tr.	....
<i>Gnaphalium sandwicense</i> (enaena)	4	0.7	0.3	38
<i>Hypochaeris radicata</i> (gosmore)	84	15	7.0	45
Unidentified plants				
Grass seed (?)	2	0.4	0.4	
Reddish seed	3	0.6	Tr.	
Moss	22	4	Tr.	
Lichen	12	2	Tr.	
Arthropoda	2	0.4	Tr.	
Unrecognizable remains	....	....	55.9	
Identifiable remains	....	....	44.1	

¹ See text, this species.

Table 2
Sources of Foods of the Hawaiian Goose Analyzed for Composition

Name	Date collected	Locality	Part analyzed
<i>Carex wahuensis</i>	Jan. 6, 1946	H. N. P., Mauna Loa, 4500-6000 ft.	whole fruits
<i>Coprosma ernodeoides</i>	Nov. 4, 1945	H. N. P., Mauna Loa, 5000-6000 ft.	whole fruits
<i>Deschampsia nubigena</i>	Oct. 21, 1945	H. N. P., Mauna Loa, 5000 ft.	green leaves
<i>Hypochaeris radicata</i>	Dec. 16, 1945	H. N. P., Mauna Loa, 4000-6000 ft.	green leaves
<i>Hypochaeris radicata</i>	Nov. 18, 1945	H. N. P., Mauna Loa, 4000-6000 ft.	seed heads
<i>Rubus rosaeifolius</i>	Jan. 20, 1946	H. N. P., Mauna Loa, 4000 ft.	whole fruits
<i>Styphelia Tameiameiae</i>	Dec. 2, 1945	H. N. P., Mauna Loa, 5000 ft.	whole fruits
<i>Vaccinium reticulatum</i>	Oct. 8, 1945	H. N. P., Kilauea Crater, 4000 ft.	whole fruits

Table 3
Chemical Composition of Some Foods Eaten by the Hawaiian Goose

Name	Moisture	Protein N×6.25	Ether Extract	Carbohydrate (by difference)	Crude Fiber	Ash	Ca	P	Thiamine mcg/100 gm.	Riboflavin mcg/100 gm.
<i>Carex wahuensis</i> . Seeds.	48.0	3.7	3.0	29.7	14.0	1.6	.048	.056	78	130
<i>Coprosma ernodeoides</i> . Fruits.	91.0	0.4	0.6	5.8	1.8	0.4	.026	.013	20	too low to measure
<i>Deschampsia nubigena</i> . Greens.	43.9	3.9	1.25	28.7	18.0	4.2	.077	.049	128	152
<i>Hypochaeris radicata</i> . Seed heads.	-----	-----	-----	-----	-----	1.8	.243	.078	63	100
<i>Hypochaeris radicata</i> . Greens.	87.9	1.7	0.70	6.2	1.75	1.7	.222	.043	30	140
<i>Rubus rosaeifolius</i> . Fruits.	81.3	1.25	2.36	10.0	4.32	0.75	.032	.051	20	25
<i>Styphelia Tameiameiae</i> . Fruits.	30.2	1.7	6.7	34.1	26.6	0.7	.145	.014	16	too low to measure
<i>Vaccinium reticulatum</i> . Fruits.	92.8	0.25	1.1	4.9	0.75	0.2	.019	.009	16	less than 10

Coprosma ernodeoides has purple juicy fruits with large central seeds. These also are high in moisture but relatively low in all other substances. Presumably these juicy fruits are important in furnishing water on the dry mountain slopes of the Nene range. *Rubus rosaeifolius* proved rather high in ether extract and richer in crude protein, carbohydrate, crude fiber, ash, calcium, phosphorous and riboflavin than the fruits just mentioned. *Styphelia Tameiameiae* is a shrub with an abundance of small pithy fruits with a central pit which were frequently encountered in the droppings. They probably serve as a grinding agent in the gizzard. The fruits were the lowest in moisture of all types tested, but they were the highest in carbohydrate, ether extract and crude fiber. They were moderately high in calcium.

Greens consisting of leaves, stems, and flowers form the bulkiest component of the diet of the goose. Both grasses and herbs provide large amounts of this material. Among the grasses, *Deschampsia nubigena* and *Digitaria* were of highest occurrence and volume in the droppings. The green leaves of the herb *Hypochaeris radicata* were much higher in moisture than the leaves of *D. nubigena*, although it is difficult to know how closely the moisture content of these foods should be compared because of unavoidable differences in treatment between the time the greens were picked and analyzed. The leaves of *H. radicata* were next highest to the seed heads of the same plant in calcium. This abundant herb apparently serves to supply a large proportion of the calcium consumed

by the goose. In the Hawaii National Park, pheasants (*Phasianus colchicus*) and quail (*Lophortyx californica*) were also found to eat quantities of this plant.

Apparently grass greens supply a large portion of the proteins, although grain and seeds may prove to furnish large amounts when they are available. Crude fiber passes through the digestive tract in large quantities. Most of the foods appeared relatively low in phosphorous.

Foods in the environment.—Grass stands out as a more important food item than herbs or shrubs both by number of occurrences and volume (table 4). However, many greens were unrecognizable as to species and many probably represented some of the herbs. Ferns of many species are present in the environment of the Nene, but if taken they did not show up in the droppings. Most of the fruits consumed come from plants

Table 4
Plant Habit Groups Found in 543 Droppings

Habit	Number of occurrences	Per cent of identified plant items	Per cent of total volume of 543 droppings
Grasses and sedges	401	43	25.6
Herbs	256	28	11.4
Shrubs	267	29	6.7

of shrubby habit, although some were from herbs. Trees contributed no food items identified, although some seeds may be ingested occasionally and tender growth from seedlings may be eaten.

Most of the important food plants grow in moderately wet areas (table 5). This accords with what would be expected, for the greater part of the Nene range occurs in the moderately wet regions.

The plants utilized as found in the droppings are only a portion of the plants available in any of the areas studied, usually not more than half, as shown by lists of plants made in the vicinities where droppings were collected. Invariably the droppings showed some plants that could not be found by the author, indicating that the geese must feed in several spots within short periods. This is corroborated by observations that the Nene fly about over a number of square miles during any one day.

There is nothing to indicate that any particular food plant especially attracts the Nene in all regions. None plays the role of a limiting factor. The Nene occupies a zone where a variety of foods is obtainable, where the vegetation is an open forest or grassland or brush, and here the climate is dry to rather wet but for the most part with not over 80 inches of rainfall per year. This bird avoids the closed, humid forest of lowland and upland alike.

The upland habitat of Mauna Loa and Hualalai is characterized by land either covered with a thin soil layer or without continuous soil cover. In general, the former supports grassland and the latter shrub. New Mauna Loa lava flows are invaded by shrubs, mainly *Vaccinium* and *Styphelia*, the speed of invasion depending mainly upon climate but also upon surface characteristics of the lava. The Nene utilize plants found in all upland vegetative types except deep, wet forest and the sparse moss-lichen growth of alpine and recent lava flows.

The porous condition of lava precludes the holding of water at the surface in lakes or streams, hence the dryness of the general environment. In the relatively restricted areas where volcanic ash forms a surface layer more impervious to water, deeper soil, rain pools and a more mesophytic vegetation are found. Mesophytic grassland is doubt-

less more favorable habitat for the Nene than the dry lava. The Ainahou Kipuka in Humuula frequently has temporary rain pools, and to these the Nene come probably to feed at the edges. No community of aquatic vegetation has developed, but only moisture-tolerant terrestrial plants occur there.

The lowland habitat of Hualalai, Kilauea, Mauna Loa, and western Kohala is likewise characterized by vast areas of naked, porous lava, as well as much more restricted areas of volcanic ash with continuous soil cover. Ranching activities are carried out on the grasslands. While the almost barren lava flats near the sea are available to the Nene

Table 5
Food Plants Classified in Relation to Rainfall

Dry areas (15-40 inches)	Moderately wet areas (40-60 inches)	Wet areas (over 60 inches)
<i>Bidens</i>	<i>Carex wahuensis</i>	<i>Axonopus affinis</i>
<i>Bulbostylis capillaris</i>	<i>Coprosma ernodeoides</i>	<i>Cyperus polystachyos</i>
<i>Gnaphalium sandwicenseum</i>	<i>Cyperus polystachyos</i>	<i>Digitaria violascens</i>
<i>Panicum tenuifolium</i>	<i>Deschampsia nubigena</i>	<i>Rubus rosaeifolius</i>
<i>Solanum nodiflorum</i>	<i>Digitaria violascens</i>	
<i>Sonchus oleraceus</i>	<i>Fragaria chiloensis</i>	
<i>Styphelia Tameiameiae</i>	<i>Gnaphalium sandwicenseum</i>	
<i>Vaccinium reticulatum</i>	<i>Hypochaeris radicata</i>	
	<i>Rubus rosaeifolius</i>	
	<i>Solanum nodiflorum</i>	
	<i>Sonchus oleraceus</i>	
	<i>Styphelia Tameiameiae</i>	
	<i>Vaccinium reticulatum</i>	

in North Kona, they probably lack an abundance of green foods in the dry periods, which tend to occur in summer months. Wild grains, however, may be available during the summer dry periods in the lowlands.

Grassland vegetation is modified by ranching use both by cattle grazing and the introduction of grasses and pasture weeds. Many of the introduced grasses and herbs are utilized by the Nene as food, so the changes may not be deleterious as far as food supply is concerned, except in overgrazed areas where vegetation tends to be destroyed. The details of vegetative changes following severe overgrazing of upland pastures are not completely known, but if soil cover is lost and shrubs tend to enter, it is likely that the shrubs themselves will be a source of food to the Nene. It appears that food is not likely to be limiting in upland areas.

Since several of the most utilized plants, such as *Deschampsia*, *Vaccinium*, and *Styphelia*, are dominants in upland vegetational groups, the Nene is well adjusted to food potentialities in the upland environment of grassland and alpine shrub.

Most of the plants respond to seasonal climatic conditions and grow more vigorously during the summer in the uplands. However, berry-bearing shrubs such as *Vaccinium*, *Styphelia*, and *Rubus rosaeifolius* have some fruit the year around, although the quantity varies seasonally. Certain shrubs are more rigorously seasonal, such as *Rubus hawaiiensis*, which bears fruit only in early summer on Mauna Loa in the park. Seasonal data on *Solanum* is lacking. Greens and fruits and seeds are to a degree seasonal in occurrence, but they are never totally lacking even on the higher slopes of Mauna Loa, as they might be if they were covered by deep snow. This does not happen, as snow seldom falls below 7500 feet.

On the hot, dry lower flanks of leeward Mauna Loa, just above sea level, abundant fresh green growth is practically limited to times of rainy weather. This is true on the South Kona coast and probably equally true on the North Kona coast. Seasonal effects

may be more pronounced in their influence on the abundance of Nene food here than in the uplands. It would be natural that a persecuted remnant population would retreat to the uplands rather than the lowlands; because of the scarcity of suitable foods in the hot dry lowlands during the dry seasons, whereas foods are available throughout the year in the uplands regardless of weather. Food factors appear likely to have influenced distribution somewhat during the recent period of range reduction by offering a more continuous supply of food plants throughout the year in the uplands than in the lowlands, although other non-food factors may have been more important. There seems to be no direct causative connection between any changes in food supply and the general decrease of the Nene during the past century, as all indications are that the food supply is adequate in quality and more than adequate in quantity over large areas of the Nene range.

Droppings from the Koa Oasis represented the dry Kau desert. On January 15, 1944, 13 species of plants of all habits were found growing there. Four of these were recovered in the droppings, and in addition the droppings contained remains of four species not found at the oasis. Two of the species, *Bulbostylis* and *Agrostis*, which grew there and were prominent in the droppings from the oasis were not found in droppings from other areas.

Droppings from Hawaii National Park above 4000 feet represented the moderately wet slopes of Mauna Loa. Plants collected from 3-trees kipuka (6250 ft.) numbered 36, while other species growing nearby added up to a total of 45. The number would be larger if plants of higher altitudes were to be included. In droppings from 3-trees kipuka 19 species were identified, of which 14 were plants found growing in the kipuka. It was evident that some choice of food plants was made from among those present on the Mauna Loa slopes, suggesting that the greater the number of types of plants there are present the more the element of choice enters into a determination of the Nene diet.

Droppings from the vicinity of Aina Hou represented the wet grasslands of Humuula. The moisture-tolerant *Axonopus affinis* was prominent in the droppings and, where the Nene had been feeding on nearby lava flows, native grasses, sedges, and fruits were conspicuous. Again it is evident that the goose is independent of any particular species of plant and utilizes various plants as they may offer food resources.

Droppings from the summit of Hualalai illustrate a habitat similar to the upper slopes of Mauna Loa above the grasslands. Of 27 species of plants seen there, only 6 appeared in the droppings, and most prominent among these were *Carex wahuensis*, *Styphelia Tameiameiae*, *Deschampsia* and *Vaccinium reticulatum*, indicating either selection or that the droppings represent food ingested elsewhere. The occurrence of *Gnaphalium sandwicensium* seems to indicate local feeding here, however.

Collections from the vicinity of Poohohoo represent the Puuwaawaa area of medium altitude in a rather wet belt. It is probable, however, that foods from the dry areas of lower elevations to the south were represented in the droppings. Forty-one kinds of grasses and herbs were listed for this general area, and only three of these were identified in the droppings. Four additional species of lowland and medium altitude identified in the droppings could not be found growing in the areas searched. This again suggests feeding in various areas within short periods of time as the geese fly about in the course of a day.

Similarity of food taken by possible competitors.—California Quail (*Lophortyx californica*). The range of the California Quail partly overlaps that of the Nene, as it is found in dry to moderately wet areas of sparse forest and grassland. In Hawaii National Park it occurs from about 2000 to 7000 feet. Fourteen quail stomachs from Hawaii National Park showed the following items in significant amounts: *Hypochaeris radicata*

(gosome), seeds, leaves, flowers; *Carex wahuensis* (sedge), seeds; Gramineae (grass), seeds; Arthropoda; Mollusca.

The quail draws on the same foods as the Nene in the vegetable kingdom, although there may be a relatively higher usage of grains and seeds and lower usage of greens. Their niches obviously do not coincide but are somewhat related. The quail takes more animal matter. Does "competition" exist between the two species? Reactions between them on account of this overlap of range and food habits are undemonstrated. The numbers of individuals involved are small, for in the Nene the rather extensive range is far from saturated, and in the quail, extensive areas inhabited by the Nene support a relatively low quail population.

Pheasant (*Phasianus colchicus*). More than one variety or subspecies of pheasant occur side by side in the national park and elsewhere on Hawaii. The pheasant range probably overlaps the Nene range to a greater degree than does that of the California Quail, as it includes wet and rather thickly forested areas as well as the dry and moderately wet belt, sparse forests and grasslands. Twelve stomachs from Hawaii National Park showed the following foods as important: *Styphelia Tameiameiae* (pukeawe), fruits; *Hypochaeris radicata* (gosome), seeds, leaves, flower buds; *Rubus rosacifolius* (thimbleberry), fruit; *Vaccinium reticulatum* (ohelo), fruits; *Coprosma ernodeoides* (kukainene), fruits; *Carex wahuensis* (sedge), seeds; Arthropoda; Mollusca.

These foods correspond even more closely with Nene foods than do those of the quail. However, the same considerations concerning competition apply here as in the former case. Under present conditions it is entirely likely that the pheasant exerts no depressing influence upon the Nene in respect to foods.

Peafowl (*Pavo cristatus*). The peafowl is naturalized in the Puuwaawaa area on the slope of Hualalai from about 2500 to 4000 feet. It inhabits the rather open forest and the borders of the pastures. It roosts in trees at night and forages in the fields in the early morning, retiring to cover during the day. We have no information on its foods. No interaction between the peafowl and the Nene was observed during field work at Puuwaawaa, and it seems unlikely that this fowl has any adverse effect upon the Nene under present conditions.

Turkey (*Meleagris gallopavo*). So few wild turkeys now remain on the ranges that they need not be considered a competitor. A few were seen at Puuwaawaa.

Guinea fowl (*Numida meleagris*). This bird does not naturalize extensively but is seen in small flocks on a few of the ranches, as on Mauna Loa near Keawewai. Certainly it is not a competitor in any practical sense under present conditions.

Geese. Several species of wild geese come to the Hawaiian Islands as winter visitors and may associate with the Nene at shore ponds in the lowlands. White-fronted Geese (?) were once seen feeding in vegetation in shallow water at Lanihau in North Kona. The numbers seem too small to allow of effective competition.

Goats. Under conditions of heavy goat browsing on limited areas, a great reduction in availability of food occurs, as seen at 3-trees kipuka, Hawaii National Park, from 1941 to 1946. The Nene would probably not linger for long at one of these depleted spots, but would fly on to other localities. Under light goat browsing, the plant food supply appears to remain adequate. In an indirect sense, goats exert an influence upon the Nene through modification of the soils and plants over a long period of time. It is likely that the soil losses in the dry sections of the national park in Kau are largely a result of heavy goat usage with destruction of the plant cover (Fagerlund and Mitchell, 1944:13).

Sheep. Bands of sheep reduce vegetation to a minimum on the barren slopes of

Mauna Loa facing Mauna Kea and Hualalai. It is likely that Nene are somewhat affected by pressure of sheep browsing.

Cattle. Wild cattle inhabit inaccessible forests, but under present conditions are probably less important as depressors of vegetation than sheep and goats.

Feeding behavior.—On November 28, 1941, the following observation was made between 2:45-4:30 p.m. at 3-trees kipuka: I found one Nene here and collected droppings which were scattered well over the kipuka, though thinly. The Nene was below the second tree and honked when it saw me. I froze, slowly retreated from sight in the lava channel about twenty yards below the goose and then stalked as close as possible, watching it forage in the weeds. It plucked gosmore (*Hypochaeris radicata*) flowers and swallowed them and also portions of the stems. It often turned its head and plucked a flower or seed head by the stem with the head hanging from the side of its mouth. There it stayed until it opened its bill to feed again or honk, when the food would drop out. I saw it crop about five flowers in 2 or 3 seconds. It also seemed to take something from poha (*Physalis peruviana*) vines. It spent much more time looking around than eating (it was aware that I had seen it but presumably didn't know I had stalked closer); its crop was bulging. It gave extended groans often and occasionally series of shrill high squawks. Twice it stretched up and flapped its wings. It walked around slowly among the weeds now and then but mostly stood still. Twice it went up on a look-out rock and watched for 10 or more minutes.

The Nene seems to pluck more than to peck, getting most of its food directly off the plant rather than probing on the ground for grains.

Feeding of captive Nene.—Nene are said to be easy to maintain in captivity if some of their psychological requirements are met, which will not concern us here. A few experiences on record teach us a little about food requirements, although no systematic experimentation has been conducted to our knowledge. One owner of a flock kept his birds in a large enclosed area where they had access to a brackish water pond and marsh vegetation. These birds ate quantities of napier grass (*Pennisetum purpureum*) and were fed grain twice a day. When breeding, they were removed to pens, where the young were raised in their early stages. In one year about a half dozen young in the downy stage died, and the owner attributed it to lack of sufficient lettuce (greens), and confinement for too long a period following hatching. The young in this flock in other years died frequently after reaching an age of about two months, the cause undetermined.

Another owner had a small flock confined in an enclosure 60 by 60 feet in the hot, dry lowlands. A small brackish water pond too small for swimming was within the enclosure, and a few grasses and weeds managed to survive. These birds were fed mainly on wheat supplemented with fresh cabbage and lettuce when available or with succulent greens and grasses in small amounts. It appeared that there were periods of days when no greens were available. These birds had never bred successfully in this enclosure. On the few occasions when eggs were laid, they were abandoned after a few days of incubation. Several factors were probably unfavorable in this situation, but it is possible that some dietary deficiency was mainly responsible for the lack of reproductive vigor.

SUMMARY

The Hawaiian Goose is a vegetarian subsisting on greens, fruits and grains. Thirty-one plant foods were identified through analysis of 543 droppings. The plants represented grow in areas which receive between 15 and 120 inches of rainfall per year and which lie between sea level and 9000 feet elevation. During hot dry seasons green food is scarce in the parts of the range on the leeward side of the island of Hawaii near sea

level, whereas during all seasons of the year a variety of foods is available at higher elevations. The goose is not dependent on any one food but tends to utilize plants which are abundant in any particular locality. This is illustrated by examples of the foods used at several localities.

The greater availability of food in the interior uplands may have favored the retreat of the remnant population of the goose to the uplands rather than to the lowlands.

The similarity of the food habits of possible competitors is discussed.

An example of the feeding behavior of the Hawaiian Goose is described.

The failure of captive birds to breed and the loss of young hatched in captivity may have been due to inadequate foods.

Data on the chemical composition of eight foods are presented.

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LITERATURE CITED

- Baldwin, P. H.
1945. The Hawaiian goose, its distribution and reduction in numbers. *Condor*, 47:27-37.
- Brigham, W. T.
1909. The volcanoes of Kilauea and Mauna Loa. B. P. Bishop Mus., Mem. 11, No. 4, vii + 222 pp.
- Fagerlund, G. O., and Mitchell, A. L.
1944. A checklist of the plants, Hawaii National Park, etc. *Hawaii Nat. Park Nat. Hist. Bull.* No. 9, Mimeo., 76 pp.
- Henshaw, H. W.
1902. Birds of the Hawaiian Islands, etc. (Honolulu, Thos. G. Thrum), 146 pp.
- Lamb, S. H.
1937. The nene in Hawaii. *Hawaii National Park MS.*, 4 pp.
- Miller, A. H.
1937. Structural modifications in the Hawaiian goose (*Nesochen sandvicensis*), a study in adaptive evolution. *Univ. Calif. Publ. Zool.*, 42:1-80.
- Peale, T. R.
1848. Mammalia and ornithology. *U. S. Expl. Exped.*, 8:i-xxv + 17-338.
- Pope, W. T.
1932. The Hawaiian goose or nene. *Hawaiian Annual for 1933*:107-112.
- Ripperton, J. C., and Hosaka, E. Y.
1942. Vegetation zones of Hawaii. *Hawaii Agr. Exper. Sta. Bull.* 89, 60 pp.
- Whitney, L. D., Hosaka, E. Y., and Ripperton, J. C.
1939. Grasses of the Hawaiian ranges. *Hawaii Agr. Exper. Sta. Bull.* 82, 148 pp.

Berkeley, California, March 1, 1947.

RECORDS OF OCCURRENCE OF SOME SOUTHWESTERN BIRDS

By ALLAN R. PHILLIPS

The following data, gathered in the course of preparing a list of the birds of Arizona, are published separately at this time for the purpose of establishing correct ranges and other important facts. These are placed on record for the use of the committee of the American Ornithologists' Union now preparing a new edition of the Check-list of North American birds. Records are for Arizona unless otherwise stated.

I am greatly indebted to Drs. Max M. Peet and L. C. Sanford, Messrs. William X. Foerster, Lyndon L. Hargrave, and Gale Monson, and the authorities of the American Museum of Natural History, United States National Museum (including the Fish and Wildlife Service), University of Michigan Museum of Zoology, Museum of Comparative Zoology, Cornell University, and the University of Arizona (including the Arizona State Museum) for permission to study their collections and, in some instances, manuscripts and files, as well as for numerous courtesies. Several other collections were examined more hastily. Specimens whose location is not given are in the writer's collection.

Colymbus dominicus. Least Grebe. One seen by Foerster and Ross J. Thornburg at City Farms, four miles northwest of Tucson on December 28, 1941. Local ornithologists questioned this identification, and the bird was therefore reported in the Audubon Magazine "Christmas Census" as a Pied-billed Grebe. On September 19, 1943, Foerster, accompanied by Milam B. Cater, again saw a Least Grebe, this time at a pond six miles northeast of Tucson; he again found it there on September 21, and on September 26, at his suggestion, Hargrave took the bird, which was identified as *C. d. bangsi* by A. J. van Rossem. This is the northernmost specimen of the species yet taken, but Mearns' journals at the National Museum mention a bird seen at Camp Verde on July 29 and October 8 and 9, 1885.

Buteo albicaudatus. White-tailed Hawk. A "female" from Phoenix, taken by Breninger, is in the Museum of Northern Arizona. It bears no date and may be a different specimen from the "male" recorded by Breninger (Auk, 16, 1899:352). The latter, according to files of the Fish and Wildlife Service, was taken on January 15, 1899. The specimen in the Museum of Northern Arizona is the only one I have seen from Arizona; it came to the Museum from Mr. Randolph Jenks, who found it among some mounted birds in the possession of Mrs. Breninger. Inasmuch as none of these birds was from Texas or Mexico, the authenticity of the specimen appears to be beyond question.

Capella delicata. Wilson Snipe. Doubtless breeds south to near Springerville, central-eastern Arizona, where it was taken on July 5, 1936, by Frank G. Watson and on August 4 and 12, 1937, by Alvah W. Sanborn and Hustace H. Poor. Two were also seen there by Hargrave on July 14, 1946.

Colaptes auratus nanus. Flicker. The flickers breeding along the Rio Grande into southern New Mexico seem nearest this race. A female in the American Museum collected in June at Fort Hancock, Texas, measures: wing, 149 mm.; tail, 105. Two winter males in the same collection from La Mesa, New Mexico, measure: wing, 154.0 mm., 155.5; tail, 110, 110. Two of the three specimens are pale above, with the fore-crown cinnamon (almost as in *C. a. mearnsi*). All the North American forms of flickers intergrade wherever their ranges meet, and all should therefore stand as races of *C. auratus*.

Empidonax wrightii (= *E. griseus*). Gray Flycatcher. Breeds south and east to New Mexico, where it is one of the most widespread of the breeding small flycatchers: Alto and Inscription Rock (Amer. Mus.); Fort Wingate (U. S. Nat. Mus.); Reserve (Peet Coll.); eight miles east of Zuni, and probably (juvenile, August 2) two miles east of Quemado, Catron County (taken by Sanborn and Poor). In Arizona it breeds south to the vicinity of Fort Apache, where a male with enlarged testes was taken on July 23, 1937 (S. L. Green), while a juvenile male (U. S. Nat. Mus.) taken as late as September 4, 1873, is so young that it must have been raised there.

To the north, the species probably does not range regularly beyond Fort Bridger, Wyoming (Univ. Mich.), but a straggler was taken five miles north of Cody, Wyoming, on July 2, 1910 (Fish and Wildl. Serv.). It is apparently rare north of Colorado, as I have seen only two specimens from Wyoming.

Empidonax oberholseri (= *E. wrightii* of current literature). Wright Flycatcher. Southernmost specimens examined are in the collection of the Fish and Wildlife Service from Guerrero (Tlapa, December 3, 1894; Omilteme, May 16, 1903). Probably ranges south to Oaxaca, but the two specimens from that state, taken in October, 1894 (Fish and Wildl. Serv.), are both molting their primaries, and I cannot be certain of their identification. Specimens from Guatemala which I have examined have all proved referable to other species.

Breeds south, as I have previously stated, to the White and San Francisco mountains of Arizona. Most of the supposed breeding records for New Mexico are erroneous, but a female (Fish and Wildl. Serv.) was taken at Lake Burford, June 11, 1918. Even as a transient it is singularly scarce in New Mexico, considering its common occurrence in Trans-Pecos Texas, north to the New Mexican border. The easternmost record is for a point fifty miles north of Roswell, September 22, 1902 (Fish and Wildl. Serv.).

Empidonax hammondi. Hammond Flycatcher. Breeds south to the Sangre de Cristo Mountains of northern New Mexico (Amer. Mus.): Taos Peak (8500 to 9000 feet) and Elizabethtown. The birds found breeding near Taos on July 18, 1904, were also of this species (Fish and Wildl. Serv.).

Empidonax minimus. Least Flycatcher. Ranges west in migration to extreme western Texas. Immatures taken at Fort Davis on September 5, 1916, and at Madero Creek, Presidio County, on September 21, 1887 (Amer. Mus.).

Empidonax difficilis cineritius. Western Flycatcher. This race migrates at least as far as the Sonora side of the Gulf of California. A female (Amer. Mus. no. 131642) taken on Tiburon Island, April 12, 1911 (P. I. Osburn), agrees exactly with birds from the Sierra de la Laguna. On the other hand, the few migrants and winter birds examined from the lowlands of southern Baja California are of other races, mostly *E. d. difficilis*; one unsexed bird taken by Belding at "Laguna" on February 2, 1883 (U. S. Nat. Mus.) measures: wing, 70.0 mm.; tail, 63.2. The latter is thus a male of the interior race, *E. d. hellmayri*.

Hylocichla ustulata swainsoni. Olive-backed Thrush. Ranges west, rarely, to central Arizona in migration. The only authentic records known to me are specimens taken in May at Tucson (Ariz. State Mus.), and from Camp Verde and the Chiricahua Mountains (Amer. Mus.). These three are indistinguishable from eastern specimens. Peculiarly enough, the weakly characterized race *almae* (which is decidedly less satisfactory than *H. u. oedica*) is apparently only casual as a migrant in Arizona but will probably prove to breed on San Francisco Mountain, where thrushes presumably of that race were heard singing on July 24, 25 and 26, 1933 (Phillips, H. I. Cone, C. W. Quaintance) but could not be obtained. The main migration route of *almae* is evidently east of New Mexico.

Hylocichla fuscescens salicicola. Veery. The southern limit of the breeding range is on the Little Colorado River southwest of Springerville, central-eastern Arizona, where singing males with greatly enlarged testes were taken on July 3 and 4, 1936 (Poor, Watson, and Jenks). This is still another thrush that moves more east than south on migration; published records for southern Arizona are probably due to confusion with *H. u. ustulata*. The migration route lies entirely east of New Mexico.

Anthus spinoletta. Water Pipit. The southernmost breeding station is on the White Mountains of Arizona, where a female and male were taken July 12 and 23, 1936, by Poor and Watson.

Peucedramus olivaceus. Olive Warbler. Occurrence of this warbler northeast to central-western New Mexico is substantiated by a male taken at Reserve on September 17, 1927 (Pett Coll.).

Dendroica occidentalis. Hermit Warbler. Migrates east, at least in fall, to western New Mexico: Reserve, September 13 and 18, 1927 (Pett Coll.); Animas Peak, August 3, 1908 (Fish and Wildl. Serv.); also three specimens from San Luis Mountains on the border and in Chihuahua (U. S. Nat. Mus.; Fish and Wildl. Serv.).

Geothlypis trichas occidentalis. Yellow-throat. Males of the type series from Truckee River, Nevada (Mus. Comp. Zool.), are bright birds measuring: wing, 58.0 mm. (type), 59.2; tail, 55.1 (type; shot, so measurement is approximate), 55.6. I cannot distinguish them from *scirpicola*. (Compare the measurements given by Grinnell, Univ. Calif. Publ. Zool., 12, 1914:203, for *scirpicola*.) The name *arizela* should therefore be restored to the small, dull coastal and Canadian race now improperly called *occidentalis*.

Setophaga ruticilla. American Redstart. Probably breeds southwest to central-eastern Arizona, as a male with greatly enlarged testes was taken on the Little Colorado River southwest of Springerville on July 3, 1936 (Jenks).

Dolichonyx oryzivorus. Bobolink. Probably breeds southwest to Showlow, Navajo County, Arizona, where a male with greatly enlarged testes was taken on July 11, 1937 (Poor).

Icterus pustulatus. Scarlet-headed Oriole. Immature male (Ariz. State Mus. no. 802) taken by Herbert Brown at Tucson on December 19, 1886. This specimen is referred to the race *microstictus* by Oberholser.

Tangavivus aeneus milleri. Red-eyed Cowbird. Now a permanent resident about Tucson, although still uncommon in winter. Male found dying on February 6, 1940, by Dr. William L. Holt, and others seen the same winter.

Piranga ludoviciana. Western Tanager. This is one of several birds, such as the Yellow-headed Blackbird, Black-headed Grosbeak, Lazuli Bunting, and certain flycatchers, that migrate both late in spring and early in fall. Many June and July records, therefore, are for points well away from the breeding grounds. That the Western Tanager breeds below the ponderosa pines (Transition Zone) is doubtful, in my opinion. I found it fairly common in the upper Santa Catalina Mountains, Arizona,

throughout June and early July, 1934, and it doubtless breeds there, as well as in the Guadalupe Mountains of Texas (see Burleigh and Lowery, Occ. Pap. Mus. Zool. La. State Univ., 8, 1940:137). Breeding in the Huachuca Mountains, Arizona, seems probable also (see Willard, Condor, 20, 1918:168). But certain supposed breeding localities farther south seem to me very doubtful; its breeding in Brewster County, Texas, is not established by specimens taken on June 1 and July 18; the earliest in a series of specimens from Rancho la Arizona, northern Sonora, was taken July 24 (Peet Coll.).

Spinus pinus macropterus. Pine Siskin. The vagrant habits of siskins seem to be nearly as pronounced as those of crossbills. A series of seven winter birds from the San Francisco Mountains (Williams to Flagstaff, November 24 to March 14) prove without exception larger, particularly in tail length, than *S. p. pinus*. Measurements of the series, which is in the Museum of Northern Arizona, are: wing, males 73.3 mm. and 77.0, females 71.5 to 73.0; tail, males 49.0 and 50.0, females 47.4 to 49.7 mm. In color the Arizona birds are more like northern birds than like those of southern Mexico, but northern birds are smaller, the maxima for wing and tail of males being 75.0 and 48.7 mm., respectively, whereas in females, these seldom exceed 73.0 and 46.0 (maxima in large number examined was 74.5 and 47.0). Average measurements of northern birds are: male 73.0 and 46.0; female 70.0 and 44.0. Northern limits of the range of *macropterus* are the San Francisco Mountains and, in New Mexico, Taos (Amer. Mus.), Arroyo Seco, and Questa (both Fish and Wildl. Serv.), on the basis of specimens measured. The majority of summer birds, however, are of the small race, and the only birds marked as breeding are of that race, except for a male from Cloudcroft, New Mexico (Amer. Mus.) and two specimens from the Santa Rita Mountains, Arizona (Cornell Univ.), which I now place with *macropterus*. The breeding range of the small race extends south at least to the Mogollon Plateau, Arizona, and the two specimens seen from the Sierra San Pedro Mártir, Baja California, are likewise small, although in the current literature they are designated as *macropterus*; they measure: male 75.1 mm. and 45.8, female 70.0 and approximately 45.2 mm. (Amer. Mus.).

Siskins taken from the same flock vary far more in color than in size, in my experience, and I am inclined to suspect that Aldrich (Proc. Biol. Soc. Wash., 59, 1946:133-135) has placed too much reliance on color and not enough on size in identifying races. Specimens from Arroyo Seco, New Mexico, are a case in point: these three males measure as follows: wing, 73.5 mm., 74.5, and 77; tail, 49.5, 48.2, and 50.2.

Spizella atrogularis evura. Black-chinned Sparrow. Winters fairly commonly, although perhaps locally, in the scattered brush of hillsides in high Lower Sonoran and low Upper Sonoran zones, north as far as the south slope of the Natanes Plateau, Gila County, Arizona, where I took five specimens in January, 1937. It thus winters within a few miles of its breeding range, as well as in the mountains farther south and west.

Zonotrichia leucophrys oriantha. White-crowned Sparrow. This is another boreal bird that breeds south to the White Mountains, Arizona, where a singing male with greatly enlarged testes was taken on July 11, 1936 (Poor). The bird was found at timberline.

Passerella iliaca altivagans. Fox Sparrow. Ranges east on migration, at least casually, to the Huachuca Mountains, Arizona (one specimen, Sanford Coll.).

Passerella iliaca schistacea. Slate-colored Fox Sparrow. Winters southeast to Las Vegas, New Mexico (December 5, 1915; Mus. Comp. Zool.).

Museum of Northern Arizona, Flagstaff, Arizona, November 9, 1946.

FROM FIELD AND STUDY

A Winter Wren Roost.—A roost of the Winter Wren (*Troglodytes troglodytes*) was discovered near my home at Carmel Highlands, four miles south of Carmel, California, on December 12, 1946. It was situated on the limb of a Monterey pine over a little-used road in what is known locally as "Fern Canyon." The canyon is a small ravine on the pine-covered coastal slope and is drained by a perennial stream.

The possibility of a roost at this place was brought to my attention by my daughter Alice who pointed out the excreta dropped by the birds on the pavement. That evening three or four birds were noted perched in a posture of sleep, with feathers ruffed out and tails partly spread, on a side branch of the pine limb, 12 feet directly above the center of the road. So closely were they huddled together that their feathers intermingled in the manner of roosting Wren-tits (*Chamaea fasciata*) (see Erickson, Univ. Calif. Publ. Zool., 42, 1938:pl. 13). They presented a rather nondescript appearance and certain identification was not possible until they were seen coming and going at the roost on subsequent days.



Fig. 21. Five Winter Wrens on roost near Carmel, California, January 8, 1947. Bird in center has tail somewhat horizontal and is facing away from camera.

Close above the roosting birds, with scarcely any space between, was a protecting canopy of accumulated dead pine needles. This covering resembled the sort of shelter which I had observed a Bewick Wren (*Thryomanes bewickii*) utilize for a roost (Condor, 43, 1941:279; roost no. 3x).

Four or five birds were noted on the roost each night it was inspected (except on December 26, 1946, and January 9, 1947, when only one and two were noted) until a county road crew trimmed off the branch with the roost on January 10.

The communal roosting of a bird which is known as a solitary species in winter (at least to western North American observers) might seem noteworthy. However, the "Handbook of British Birds" (vol. 2, 1938:214) states that the English race of *T. troglodytes* "roosts . . . usually singly, but sometimes . . . a number together; as many as ten recorded roosting regularly in coconut shell and thirty or more in one group of Martins' nests. Not otherwise gregarious." Skutch (Auk, 57, 1940:293-312) describes social roosting of wrens of various genera in Central America. Many of these species build special dormitory nests in which one or many may roost at one time. Some species maintain relationship between adults and offspring and may all roost together in the post-breeding period. Skutch goes so far as to say that he is "not certain that any is quite solitary during the season when it does not breed" (p. 294).—LAIDLAW WILLIAMS, Carmel, California, February 11, 1947.

Size of Bird Populations at Guam, Mariana Islands.—After the return of American forces to Guam in 1944, military highways were constructed and old roads were improved, making it an easy matter to visit most parts of the island. While engaged in biological survey work for the United States Naval Medical Research Unit No. 2, the writer recorded by kind and number the birds observed during

125 field trips in the period from May 22 to October 5, 1945. The roadway mileage on these trips totaled 1960 miles, an average of 15.7 miles per trip. Guam is approximately 27 miles from north to south and 8 miles from east to west.

Birds were recorded along paved military highways, where heavy traffic often prevailed, and along less used rural roads. All birds that were seen either near or flying across the roads were noted. No attempt was made to diagnose the bird populations according to the type of roadside habitat, but at least 80 per cent of the travel was through jungle and open woodland areas. The forested regions of the island are the preferred habitats of most of the resident land birds. The extent of clearing along the roadways appeared to influence the density and the variety of birdlife more than the type of road or the amount of traffic.

During the 125 trips, 2428 birds of 18 species were counted, an average of 1.25 birds per mile. This number included 11 of the 15 species of land birds known to be resident on Guam and 7 species of fresh-water, sea and shore birds (for a discussion of the birds of Guam, see: Mayr, *Birds of the Southwest Pacific*, 1945:283-302; and Stophlet, *Auk*, 63, 1946:534-540). The table presents a summary of the data and shows that the majority of the birds recorded belong to nine species: seven resident land birds, one fresh-water bird, and one sea bird.

Birds Observed on 125 Counts along 1960 Miles of Roadway on the Island of Guam

Species	Per cent of frequency in counts	Per cent of the total birds seen
Micronesian Starling (<i>Aplonis opacus</i>)	100.0	57.3
Philippine Turtle Dove (<i>Streptopelia bitorquata</i>)	68.0	15.5
Edible Nest Swiftlet (<i>Collocalia inexpectata</i>)	56.0	9.1
Cardinal Honey-eater (<i>Myzomela cardinalis</i>)	37.6	3.9
Chinese Least Bittern (<i>Ixobrychus sinensis</i>)	36.8	3.0
White-throated Ground Dove (<i>Gallicolumba xanthonura</i>)	31.2	2.5
Guam Crow (<i>Corvus kubaryi</i>)	21.6	2.4
Fairy Tern (<i>Gygis alba</i>)	16.8	1.6
Micronesian Kingfisher (<i>Halcyon cinnamomina</i>)	11.2	1.2
Other species	.....	3.5

The Micronesian Starling and the Philippine Turtle Dove were the birds most often observed; evidently they were well adapted to live in the extensive clearings made by the occupation forces. Of interest, also, was the frequent occurrence of the Micronesian Ground Dove along the roads. About 80 per cent of the birds seen were males; the females were less conspicuous, but neither sex appeared to have the secretive, terrestrial habits of some other members of the genus. Of the species recorded only a few times, perhaps the bird most disturbed by the military operations was the Micronesian Fruit Dove (*Ptilinopus roseicapillus*). According to native reports, this colorful species is decreasing on Guam.

These observations do not show the actual differences among the total populations of all the resident species of Guam. They do, however, indicate, the relative abundance of some of the birds which inhabit edges of the jungle and open woodlands. This environment is preferred by most of the species listed; this is especially true of the Micronesian Starling, the Philippine Turtle Dove and the Fairy Tern. The Chinese Least Bittern and the Edible Nest Swiftlet are less typical of the roadside habitat and therefore relatively (to the total population) fewer were seen.—ROLLIN H. BAKER, *Museum of Natural History, University of Kansas, Lawrence, Kansas, March 17, 1947.*

Least Grebe Breeding in California.—The writers were engaged in making a bird count on a seepage pond of several acres' extent not far southwest of the west end of Imperial Dam, on the Imperial National Wildlife Refuge, Imperial County, California, on the morning of October 18, 1946, when their attention was drawn to a pair of small grebes swimming near the shore. It was at once apparent that these were two adult Least Grebes (*Colymbus dominicus*). McMurry collected two of these grebes at the same locality on October 23, 1946, an adult male and a flightless, still downy young (female?) about three-fourths grown. A second downy young was accompanying the male, but was not collected. On this same date, a rough census of the seepage pond revealed four more adults and two more immature young. The birds were observed in open water or working along the fringes of the cattails and flooded brushland adjacent to the shore. Their characteristic call at once indicated their presence, especially when disturbed. The specimens taken have been identified by Dr. John W. Aldrich as belonging to the race *bangsi*.

Considerable interest attaches to these records, for not only do they form the first occurrence of the species in California, but also the first evidence of the species' breeding in the United States on the Pacific drainage.

Monson spent some time in this area in 1942 and 1943 without detecting the presence of Least Grebes, and they have never been reported from similar territory in any part of the lower Colorado River valley. It would be logical to assume that the species is a recent arrival in this country, having no doubt worked its way up from Baja California or Sonora, Mexico.—FRANK B. MCMURRY, *Fish and Wildlife Service, Salt Lake City, Utah*, and GALE MONSON, *Fish and Wildlife Service, Parker, Arizona, January 3, 1947*.

The Lesser Snow Goose and Canvas-back Breeding at Tule Lake, California.—On August 2, 1946, a flock of fourteen Lesser Snow Geese (*Chen hyperborea hyperborea*) were seen at the Tule Lake National Wildlife Refuge, Siskiyou County, California. It is quite probable that all these were cripples left behind when others of the species moved north in the previous spring, but when they were seen in August, all were able to fly, at least for short distances. As we approached the flock, which was resting on a levee road, nine flew and soon alighted about 200 yards away on the open water of the lake. The five remaining birds permitted us to drive our car to within forty or fifty yards of them before taking wing. They all rose in close formation and flew rather laboriously a short distance where they were studied with binoculars under very favorable conditions. Much to my amazement I saw that two were adults and three were young not fully grown. A small amount of fuzzy down still adhered to the necks and the middle of the backs of all three young. These three with their parents were seen again the next day in the same vicinity. The only possible explanation of these geese nesting so far south of their normal breeding grounds is that these two adults mated, even though one or both were crippled and could not return to their hereditary summer range, a condition not so distantly related to that of captive birds. The question now arises, will these locally hatched young go north with others of their kind, or will they remain to be pioneers in establishing a southern breeding colony? The situation deserves further study.

In the past several years unverified reports of the Canvas-back (*Aythya valisineria*) nesting in northeastern California have been brought to my attention. Such reports were nearly always from some observer that saw "cans" during the normal nesting season, but none reported the actual finding of a nest or downy young. However, some years ago while studying the matchless collection of photographs of birds taken by William L. and Irene Finley, I noted a picture taken on the west shore of Lower Klamath Lake, Siskiyou County, in the early summer of 1905. This photograph clearly shows an adult female Canvas-back with downy young which were undoubtedly hatched in the near vicinity. Unfortunately this photograph is no longer available and the exact date it was taken is not known.

Although I have several times seen adult Canvas-backs on both Lower Klamath and Tule lakes, it was not until August 3, 1946, that I personally secured evidence of their nesting. On that day I came unexpectedly close to a female with nine downy young on a small isolated pond in the old Tule Lake bed. There were no other birds on this body of water. I watched this family for some time from a distance of about fifty feet under exceptionally good light.

With the Finley photograph and this recent observation of my own we can now state positively that the Canvas-back does at least occasionally nest in the state of California.—STANLEY G. JEWETT, *Portland, Oregon, October 20, 1946*.

Courtship and Mating of Broad-tailed Hummingbird in Colorado.—In the last part of May and the first two weeks in June, 1945, I observed the courtship behavior of several pairs of Broad-tailed Hummingbirds (*Selasphorus platycercus*) in a pine forest region in the foothills of Colorado, about fifteen miles northeast of Colorado Springs.

A creek environment, intersecting the pine forest, attracted the birds, since the willows were in inflorescence. While a female flew among these bushes, a male approached and hovered near her for several seconds. Abruptly, he rose to a point twenty to twenty-five feet above the willows and remained directly over her in this position for several seconds, his head moving continuously. Suddenly, with a shrill whirr of wings, the male swooped down to the level of the female, ending his dive with a series of sharp notes "click-click-click." The performance was repeated three or more times and was seen by the observer on several different days. Two males hovered near a female in the willows on one occasion, and at another time, two males were seen quarreling.

Pitelka (Condor, 44, 1942:189-204) mentioned that descriptions of the actual mating of hummingbirds are not numerous and that it has been suggested that mating occurs on the wing. On June 2, a male and female were observed while mating. The female remained perched on a willow branch and the male alighted over her. After copulation, she shook her feathers and preened herself for several minutes before flying away.—LOUISE HERING, *University of Colorado, Boulder, Colorado, December 23, 1946*.

Use of the Creosote Bush by Birds of the Southern Californian Deserts.—Anderson and Anderson (Condor, 48, 1946:179) have reported on the use of the creosote bush (*Larrea divari-*

cata) by birds in the vicinity of Tucson, Arizona. I wish to supplement their notes by some records made in the southern Californian deserts.

Several of our birds of prey use the twigs and branches of the creosote bush; among them are the Red-tailed Hawk (*Buteo jamaicensis*) and the Golden Eagle (*Aquila chrysaetos*). The Red-tailed Hawks depend very largely on the woody stems for the main nest structure. I have in mind one very large nest built among the top branches of a 28-foot tree yucca on the Mohave Desert and at least ten nests built on shelving rocks of steep canyon walls or cliffs, both on the Colorado and the Mohave deserts. Most are made of old weathered stems, but one I saw had stems which were still leafy. Other woody-stemmed plants apparently offer suitable nest material, but creosote bush is preferred. Stems of *Larrea* are also often used in nest building by the Raven (*Corvus corax*).

At Palm Springs in April, 1916, I found the nest of a pair of House Finches (*Carpodacus mexicanus*) and also the nest of a Black-throated Sparrow (*Amphispiza bilineata*) in *Larrea*. In each instance the shrub was a large, well-branched plant in heavy leaf and flower. The nests were about four feet from the ground.

In the autumn of 1915 a hunter brought me two Gambel Quail (*Lophortyx gambelii*) he had shot at the mouth of Tahquitz Canyon near Palm Springs. I cleaned them and was surprised to find *Larrea* seeds in the crops. Later when I fried and tried to eat the meat, I found it very unpalatable because of the strong flavor of creosote bush.

On several occasions I have found the nest of the Costa Hummingbird (*Calypte costae*) placed far out among the terminal branches of the creosote bush. Since the eggs are laid and incubated at a time of year when heavy westerly winds prevail for days and weeks at a time in the desert area, one marvels that the birds would choose such swaying sites for nesting. A nest I found on a windy spring day in 1943 near Dead Man's Point on the Mohave Desert was built out near the end of a 5½-foot stem, and I estimated that the erratic but almost continual sway of the nest was over an arc of almost three feet; yet the female sat there in perfect composure.

On October 3, 1946, near Lucerne Post Office, I was surprised to find a Mountain Chickadee (*Parus gambeli*) searching the twigs of *Larrea* for food. A companion and I kept it under observation for fully half an hour. The day was very warm and the sky was overcast with heavy nimbus clouds; rolls of heavy thunder, indicative of storm and high winds, came from the San Bernardino Mountains to the south. Hence I concluded that the bird may have been driven to the desert flats by the storm in the mountains. I have seen chickadees on the desert floor in winter during times of heavy snow storms in the surrounding mountains but never before have I come upon this montane bird on the desert in warm weather.

The Black-tailed Gnatcatcher (*Polioptila melanura*) is a frequent hunter of insects in *Larrea*. We often see this species in pairs working both up and down the stems. I am not aware of all the insect species found and eaten by them but I do know they sometimes take tiny moth larvae and the small nymphs of the creosote locust (*Boottettix argentatus*). Both the Lawrence Goldfinch (*Spinus lawrencei*) and the Green-backed Goldfinch (*Spinus psaltria*) are at times seen moving about or perching on creosote twigs. The Leconte Thrasher (*Toxostoma lecontei*) frequently may be seen running from beneath one creosote bush to another, often pausing a moment in their shade or using them as a temporary refuge when disturbed by an intruder.

In late autumn of 1946, I came upon a Vesper Sparrow (*Pooecetes gramineus*) near Harvard on the Mohave Desert where *Larrea* occurs in pure stands. It was just before sunrise. I followed the bird for more than a mile. As I walked slowly forward it ran along the ground about fifty feet ahead of me moving across the open from one creosote bush to another and often hiding on the opposite side until I was almost upon it. Sometimes it would jump or flit up into the bush, then later be seen perching or moving adroitly among the rather thick-set lower branches and leaving only upon close approach.

In autumn and all during winter and early spring when the White-crowned Sparrows (*Zonotrichia leucophrys*) are about, one very often sees these birds in small groups scratching in the vegetal debris gathered about the bases of creosote bushes. They are probably getting not only seeds which have been blown in and which have lodged about the bases of the bushes but also seeds of annuals which always grow in the shelter of this shrub. It is well known that certain plants are occupants of such sites forming societies of rather constant membership and with very definite relationship to the creosote bush; the birds because of their food choices thus become linked up with the creosote bush in an ecological sense.—EDMUND C. JAEGER, Department of Zoology, Riverside College, Riverside, California, January 24, 1947.

Critical Notes on Some Western Song Sparrows.—*Melospiza melodia bendirei*. Topotypical specimens of *Melospiza melodia saltonis* from Mecca, Riverside County, California, and from Bard, Imperial County, California, were compared with specimens from the vicinity of Tucson, Arizona, and from Picacho Reservoir and Sacaton, Pinal County, Arizona. The two latter localities are close

to the type locality of *Melospiza melodia bendirei* at Tempe Butte, Maricopa County, Arizona. These specimens all showed clearly the color characters ascribed to the new race, *M. m. bendirei*, by Phillips (Auk, 60, 1943:242). In his original description Phillips neglected to mention any differences in dimensions—characters which would have strengthened the case for this race. The following measurements, in my estimation, should be added to the description of the subspecific characters of *Melospiza melodia bendirei*:

<i>M. m. bendirei</i>	Wing	Tail	Exposed Culmen
6 ♂♂	(65.3-68.4) 67.7	(68.0-73.0) 70.8	(12.0-13.2) 12.5
3 ♀♀	(61.8-64.0) 62.7	(64.0-68.5) 66.5	(12.0-12.2) 12.0
<i>M. m. saltonis</i>			
4 ♂♂	(63.9-66.0) 64.9	(66.0-68.3) 66.6	(11.5-12.5) 12.0
4 ♀♀	(61.3-63.9) 62.9	(62.9-66.2) 64.2	(11.2-12.0) 11.5

In all instances the specimens were April and May birds in which there was as yet very little evidence of feather wear. On the basis of these data, *M. m. bendirei* is further separable from *M. m. saltonis* by its longer tail and slightly longer wing, differences which are more pronounced in the adult male. The specimens examined indicate that there is no justification for any changes in the limits of the breeding range of *M. m. bendirei*, but they do emphasize more fully the restricted and limited breeding areas for song sparrows in central and southeastern Arizona.

Melospiza melodia fallax. Since more adequate comparative material is at hand and the *montana-fallax* complex has at last been clarified, I find it desirable to report further on the song sparrows of the Uinta Basin, Utah (see Twomey, Annals Carnegie Mus., 28, 1942:341-490). The breeding birds of the Wasatch Mountains, Uinta Mountains, and as far east as Moffatt County, Colorado, belong to *Melospiza melodia montana*. Unfortunately only one breeding specimen was taken at Hill Creek, forty miles south of Ouray on the Tavaputs Plateau, Utah. Except for the slightly more pronounced streaking of the back feathers, this bird is identical with specimens of *Melospiza melodia fallax* which were taken three miles south of St. George, Utah. This breeding bird extends the range of *fallax* to the southern edge of the Uinta Basin. In a series of eight song sparrows collected in the vicinity of St. George, Utah, between October 12 and 18, 1937, six were *Melospiza melodia montana* and two were *Melospiza melodia fallax*.

From September 4 to 6, 1940, a considerable concentration of song sparrows was encountered along the Verde River, four miles southeast of Cottonwood, Arizona, which is just east of the type locality of *fallax*. The three specimens collected were *Melospiza melodia fallax*. Further field work in this area of Arizona will undoubtedly prove that there are still many excellent breeding localities for song sparrows throughout this part of the State and that the type specimen of *M. m. fallax*, collected January 22, 1858, could have been a resident bird rather than a migrant.—ARTHUR C. TWOMEY, Carnegie Museum, Pittsburgh, Pennsylvania, December 19, 1946.

Additional Notes on Cranes in the Cascade Mountains of Oregon.—It was with considerable interest that I read Thatcher's report of cranes about Diamond Lake, Douglas County, Oregon (Condor, 49, 1947:42), for on May 25, 1941, my sister and I found a pair of Sandhill Cranes (*Grus canadensis*) nesting on Mud Lake, at about 4800 feet elevation, a few miles south of the Three Sisters Mountains in western Deschutes County, Oregon. The nest contained two eggs, which were not disturbed. It was placed some 100 yards from the shoreline in an area of shallow, treacherous bog. We were able to approach the nest and obtain a set of Kodachrome photographs of the nest and also of the parent birds. It was not possible to return to the nest later and determine the result of the nesting.

Eastern Lane and Douglas counties and western Deschutes and northwestern Klamath counties are dotted with innumerable permanent shallow ponds and lakes. Several miles to the south of Mud Lake is a Crane Prairie, now a reservoir, so named because of the early day abundance of cranes in the vicinity. There may be extensive nesting of cranes throughout this area, but due to its general inaccessibility, the true extent of breeding will be difficult to ascertain.—GORDON W. GULLION, Eugene, Oregon, February 21, 1947.

British Columbian Records of the Clay-colored Sparrow.—On May 29, 1946, in the course of a ten-day visit to Okanagan Landing in south-central British Columbia, I observed three males of the Clay-colored Sparrow (*Spizella pallida*). These were found in an old clearing about three miles south of the Okanagan Landing post office, along Cameron's Point Road. The ground vegetation of the clearing was a relatively dense cover of grasses, herbs, and low shrubs; young deciduous trees and tall shrubs were scattered every few feet throughout the clearing. The latter were used as singing posts by the male sparrows, which were well spaced and were singing regularly. Observations in mid-morning and again in the late morning, totalling about an hour, indicated that they had selected and perhaps established territories. During most of this time, all three males sang simultaneously. After a

period of song, one of the males foraged quietly in the herbage and low shrubs from one to three feet above the ground. Although no other individuals were seen and although I was unable to revisit the area, all evidence pointed to the likelihood that these sparrows were local residents.

British Columbian records of *Spizella pallida* are few, but it now appears that the 1931 A. O. U. Check-list is in error when it states (p. 349) that this species is merely "casual in British Columbia." The latter statement is apparently based on the work of Swarth and Brooks (Pac. Coast Avif., No. 17, 1925:95), who cite only one definite record, that of two specimens taken on July 3, 1901, in the Cariboo district (Brooks, Auk, 20, 1903:283; 22, 1905:83). One of these, a male (A.B. no. 5161), is now in the

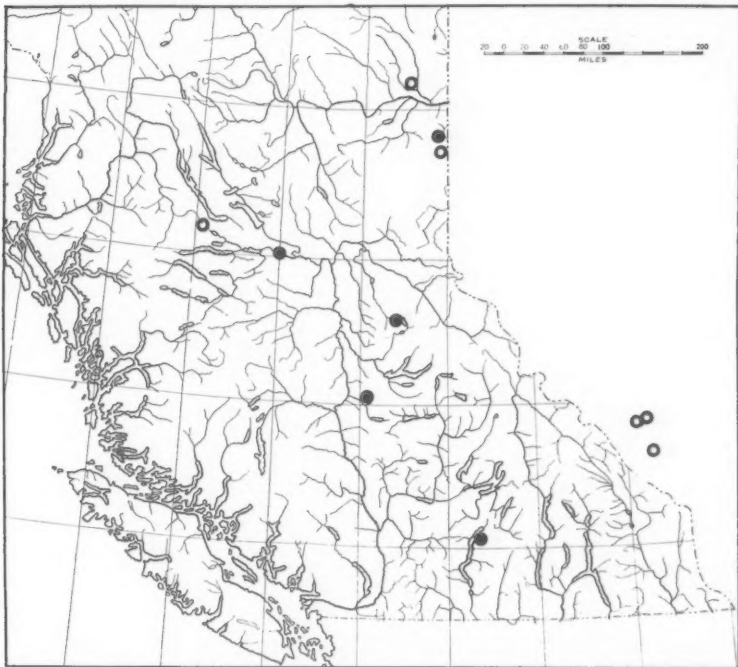


Fig. 22. Distribution of the Clay-colored Sparrow (*Spizella pallida*) in central and southern British Columbia. Dots indicate localities from which specimens have been examined; circles, localities reported in the literature.

collection of the Museum of Vertebrate Zoology; its label reads "Carpenters Mt (150 mile) / Cariboo district." Other specimens in the same collection, previously unreported, are a male (M.V.Z. no. 65716; "testes 7. mm.") collected at Indianpoint Lake on June 6, 1934, by Alden H. Miller; a male (M.V.Z. no. 83105; "singing," testes "very large") collected on June 5, 1925, and a juvenal female (A.B. no. 5156) collected on November 14, 1929, both at Okanagan Landing by Allan Brooks; and an adult female (A.B. no. 7856) taken on September 2, 1934, at Vanderhoof by Allan Brooks ("others seen . . . evidently nests there").

Other recent records are those of Racey (Murrelet, 11, 1930:71) and Cowan (Occ. Papers Brit. Col. Prov. Mus., No. 1, 1939:59) from the Peace River district and of Munro (Occ. Papers Brit. Col. Prov. Mus., No. 6, 1947:106) from Bulkley Lake, north of Francois Lake in central British Columbia. All cited records are mapped in figure 22. Recent records from an adjoining part of Alberta (Clarke and Cowan, Can. Field Nat., 59, 1945:102) are also shown.

The two summer records from Okanagan Landing appear to be the southernmost for British Columbia for the breeding season. This point is of interest in light of the possibility that the interior

British Columbian population of the Clay-colored Sparrow may be derived from around the northern end of the Rocky Mountain mass and thence east from the Canadian parklands and plains, the metropolis of this species. It is noteworthy that in the Peace River district, through which the Clay-colored Sparrow would probably have entered British Columbia if this hypothesis is correct, this species is "the most abundant sparrow" (Cowan, Occ. Papers Brit. Col. Prov. Mus., No. 1, 1939:15). Elsewhere, however, the records suggest sparse and local distribution; in a report on the Cariboo district, for example, Munro (Can. Jour. Res., ser. D, 23, 1945:91) could only cite Brooks' earlier records. Observations on date of spring arrival at the several localities mentioned here can throw light on the question of source and spread of the species.

Thus, according to present information, *Spizella pallida* occurs commonly in the Peace River district of east-central British Columbia and locally, perhaps only sporadically, west to Bulkley Lake and south to the Okanagan region. Some British Columbian records of *Spizella pallida* may have been overlooked in the preparation of this note, but I have attempted only to report unpublished records and to point out that these, together with other recent records, are adequate basis for the inclusion of interior British Columbia in the normal range of the species.

Mrs. Marjorie Brooks and Allan Cecil Brooks generously permitted me to extract notes from Major Brooks' personally annotated copy of the British Columbian list. Mr. Kenneth E. Racey of Vancouver, British Columbia, kindly showed me three specimens of *Spizella pallida* which he obtained at Dawson Creek. Through discussion with Dr. I. McT. Cowan of the University of British Columbia, the possible northern derivation of the Okanagan population was suggested.—FRANK A. PITELKA, *Museum of Vertebrate Zoology, Berkeley, California, March 10, 1947.*

Offshore Records of Mourning Dove and Hermit Warbler from Baja California.—While I was in the Navy, our ship operated frequently out of San Diego, California, usually southward along the Lower Californian coast. On May 8, 1946, three Mourning Doves (*Zenaidura macroura*) came aboard. Our position at that time was roughly 60 miles due west of Ensenada, Baja California. The nearest land was probably the Coronados Islands, at least 50 miles northeast of us. One dove disappeared, but the remaining two stayed with us until our return to San Diego at the end of the week. They finally left the ship when we were about two miles from Point Loma, flying low over the water straight toward it.

On May 9 a Hermit Warbler (*Dendroica occidentalis*) was found dead on deck in the morning, when we were still in the same area, 60 miles west of Ensenada.—ARYAN I. ROEST, *Corvallis, Oregon, February 13, 1947.*

Starling in British Columbia.—On January 15, 1947, Mr. A. J. Braun collected four Starlings (*Sturnus vulgaris*) from a flock of eight which appeared in the vicinity of Oliver, a village in the Okanagan Valley 15 miles north of the international boundary. The four specimens were mounted, and I recently have examined one of them, an adult sexed as a male. There are earlier but unconfirmed reports of Starlings seen in the Cariboo Parklands, at Williams Lake and at Alkali Lake; but so far as I am aware, the Oliver specimens are the first taken in British Columbia.—J. A. MUNRO, *Okanagan Landing, B.C., February 4, 1947.*

Frigate Birds and the Laysan Rail.—Baldwin's (Condor, 49, 1947:14-21) account of the Laysan Rail (*Porzana palmeri*) is interesting to me as I had the pleasure of participating in the Bishop Museum "Tanager" Expedition to Midway and Laysan islands in 1923. It is my impression that a Frigate Bird (*op. cit.*:16) cannot catch any animal that would try to escape by dodging. I believe that the rails could have escaped an attack by dodging. As for Dill's statement that a Frigate Bird picked up full grown rabbits, I would like to hear that this observation has been repeated. Mr. Lewis W. Walker of the San Diego Society of Natural History has experimented with the weight-lifting ability of the large birds of prey and found that their lifting power is very small. The Frigate Bird, according to my memory, does not weigh more than a full grown rabbit—of the size that I saw and killed on Laysan—and I doubt very much that a Frigate Bird could lift a half grown individual or that a rabbit in good health could be caught by a Frigate Bird. One tale, that a Frigate Bird cannot rise from the water, I disproved by taking a Frigate Bird into the water where I held it submerged all but the head. Upon releasing the bird, it rose clear with one down stroke of the wings.

We did not find any fresh water on Wake Island where rails were numerous, which would make it appear that the Wake Island rail can subsist without water (*op. cit.*:19). On the other hand there was permanent water on Laysan and Midway, where some faucets were always left dripping for the canaries, finches and rails. We brought a few rails back to Laysan and liberated them, but they apparently did not find the fresh-water "spring," as we found them all dead along the shore of the lagoon. I believe the Laysan Rail needed fresh water and that its introduction to a waterless island was a foredoomed failure.—CHAPMAN GRANT, *San Diego, California, February 10, 1947.*

Barrow Golden-eye at Benicia, California.—On January 18, 1947, a Barrow Golden-eye (*Glaucionetta islandica*) was observed at close range, swimming in Carquinez Straits just off the end of First Street Wharf, Benicia, Solano County, California. It was a beautiful adult male; the black back with row of white spots along each side, the white crescent before each eye, and the purple iridescence of the head feathers were excellently displayed in the bright sunlight. While we watched, he swam off toward a flock of ducks, mostly Canvas-backs and scaups, some two hundred yards offshore.

Although the Common Golden-eye (*Glaucionetta clangula*) is plentiful here in the winter, I have not previously observed the Barrow Golden-eye. I find there are only a few records for the San Francisco Bay region, and this appears to be the first reported observation from Solano County.—EMERSON A. STONER, Benicia, California, February 12, 1947.



Fig. 23. Wood Duck with Mallards at Encanto Park, Phoenix, Arizona. Photograph by Harry L. Crockett and Ruth Crockett.

Another Record of the Wood Duck in Arizona.—Harry L. Crockett and Ruth Crockett, of Phoenix, Arizona, observed a Wood Duck at Encanto Park in that city in 1940 and 1941. Anderson and Anderson (Condor, 49, 1947:89) have recorded a Wood Duck in the Tucson area in 1941. The pertinent observations of the Crocketts are as follows: November 11, 1940, a male was seen at the lagoon in Encanto Park; he subsequently spent five months there. On November 9, 1941, a male again appeared at the lagoon; a week later a female was present.—WARREN PULICH, Tucson, Arizona, January 3, 1947.

The Brown Thrasher in California.—On October 22, 1945, a party from the Museum of Vertebrate Zoology was camped at Cottonwood Spring, 3000 feet, Riverside County, California, within the boundaries of the Joshua Tree National Monument. This spring, surrounded by Washington palms and large cottonwoods, is truly an oasis hidden in a hollow among the desert hills. At 9:00 a.m. I saw a thrasher whose every sound and action indicated bewilderment. It worked slowly through the tops of the cottonwoods, calling loudly, and then descended to some nearby catclaw where it could be heard scratching among the dry leaves. After several minutes, the bird flew down canyon 150 yards to some small cottonwoods and then retraced its route, on the ground, beneath the brush. All the while it uttered calls as if hoping for an answer. When the bird was taken, it proved to be a male Brown Thrasher (*Toxostoma rufum longicaudus*). There are four birds of this species previously listed for California (Grinnell and Miller, Pac. Coast Avif. No. 27, 1944:347), but this is the first to be saved as a specimen and it serves to establish racial identity. The specimen is now no. 94277 in the museum's collection.—WARD C. RUSSELL, Museum of Vertebrate Zoology, Berkeley, California, January 16, 1947.

Harlequin Duck near Los Angeles, California.—The Harlequin Duck (*Mistrionicus histrionicus*) has not previously been reported south of Santa Barbara, California. On December 22, 1946, Mrs. Kent and I identified a female Harlequin Duck in the Playa del Rey area south of Santa Monica, Los Angeles County. We studied it at close range with binoculars as it repeatedly dived to feed, usually swimming a considerable distance under water.—W. A. KENT, *Los Angeles, California, January 7, 1947.*

Further Records of the Spotted Owl in the State of Washington.—In the Condor for November, 1946 (p. 283), Slipp records several occurrences of the Spotted Owl (*Sirix occidentalis caurinus*) in the state of Washington. The following are additional records for the species in Grays Harbor County: one found on the highway near McCleary, September 10, 1940; one found on the beach dunes near Grayland, October 1, 1941; two collected by Harold K. Matheson about ten miles southeast of Lake Quinalt, elevation about 1000 feet.

These specimen records and several sight records by myself and other observers make it appear that this owl inhabits the heavy timber fairly commonly in western Washington as far south as Willapa Harbor.—GORDON D. ALCORN, *College of Puget Sound, Tacoma, Washington, February 25, 1947.*

Black Rail at Salton Sea, California.—A Black Rail (*Laterallus jamaicensis*) was taken near Calipatria, Imperial County, adjacent to the Salton Sea, on January 5, 1947. This rail was captured alive and uninjured by a Chesapeake Retriever owned by me. It was found in a dense growth of green barley and wild oats at the edge of a fresh water pond while the dog was being used to hunt crippled ducks.

The black rail is fairly common in salt marshes along the coast and breeds in salt marshes near San Diego. It has been recorded inland at Chino, Riverside, San Bernardino, and Stockton. This record for the Imperial Valley is evidently the first record east of the desert divides in California.—JOHN LAUGHLIN, *California Division of Fish and Game, Riverside, California, January 22, 1947.*

Additional Records of the Scissor-tailed Flycatcher in California.—A Scissor-tailed Flycatcher (*Muscivora forficata*) was observed at La Mirada, California, on January 3, 1947. Although the bird was darkened by smoke from smudging in the nearby orchard, the conspicuous salmon-colored flanks and long tail were very much in evidence. A bird of this type seen at this locality was reported to me in April of 1946. I made several trips to the vicinity at that time but was unable to see the bird myself.—EDWARD M. HALL, *Whittier, California, January 15, 1947.*

NOTES AND NEWS

Delay in providing buckram binding has held up shipment of the Fourth Ten Year Index to the Condor to some purchasers; paper-bound copies were available in May. Copies with buckram covers should soon be in the hands of all who have ordered them.

Renewed attention, through individual appeal, is being given to the purchase of CARE packages for the relief of European ornithologists. Mrs. John T. Emlen, Jr., 2621 Van Hise Avenue, Madison, Wisconsin, will be glad to arrange for CARE packages from Cooper Club members. There is here a welcome opportunity to give critical aid to our co-workers in devastated areas.

We report with regret the death of P. A. Taverner, widely known for his books on Canadian birds, who for many years was Curator of Birds in the National Museum of Canada.

There is hardly a sailor who does not look with affection upon the gulls which follow in the wake of his ship or gaze with admiration at the skill with which petrels and shearwaters skim the crests of the waves. Often he has had to depend upon some solitary sea bird to break the monotony of a long voyage out of sight of land and other shipping. Yet strangely enough, so far as is known, no organization has ever been formed to carry out systematic observation of birds over the immense area that the seas and oceans of the world cover.

In many respects the sailor is an ideal bird watcher. First, there is his natural affection for the birds which he finds at sea; second, owing to the limited facilities for recreation, he must needs spend a fair proportion of his leisure time gazing at the sea and sky about his ship; third, he has in his ship a number of specialists who can give him much of the necessary information (meteorological and navigational) which he will require when making out his records. Also he is in a good position to obtain first class binoculars and telescopes from Service sources.

It is not, therefore, altogether surprising to hear that the more enthusiastic bird watchers in the British Navy have got together and formed a Royal Naval Bird Watching Society. The main objects of the Society are: (1) The encouragement and promotion of bird watching in the Royal Navy with special reference to bird watching at sea. (2) The cooperation with other ornithological societies in carrying out investigations connected with birds and bird movement at sea. (3) The cooperation with the British Trust for Ornithology in their special investigations and work.



Fig. 23. Vice-admiral W. L. Tebbant, President Royal Naval Bird Watching Society.

The Society is affiliated with the British Trust for Ornithology, which is the largest and most active field society in Britain and works largely on the cooperative system.

The organization of the Naval Society does not differ materially from any other, but it has, in addition to the officers of the executive council, two advisory panels from which it obtains expert ornithological guidance. The first of these is the editorial and advisory panel, composed of those members who have had most experience in ornithology and who are responsible for editing all reports and checking all records. In addition to this panel there is a "consulting panel" of four leading British ornithologists who have kindly consented to assist the Society in an advisory capacity. This latter body should ensure that the newly formed Naval Society starts off on the right track and is from the beginning obtaining the type of information that is most required. One of the consulting panel experts is probably already well known to bird students in the United States. He is W. B. Alexander, author of "Birds of the Ocean"—one of the few reference books on sea birds.

Membership of the Society is open to all ranks of the Royal Navy and Royal Marines and to their Reserve, Women's and Cadet services as well as to personnel of the Dominion and Indian navies. The aim of the society is to have at least one observer in every ship of the Royal Navy.

Individual members cooperate in the Society's activities mainly by filling in various report sheets. On a Sea Report Sheet they will report

the sighting of every bird observed at sea. Much, of course, will depend upon the experience and accuracy of the individual observer. Great emphasis has been laid upon the importance of bird identification and it is intended so far as is possible to maintain the highest level in this respect. For special inquiries observers will use special report sheets drawn up for the express purpose of the inquiries.—MAJOR NOEL BEALE, *Founder and Secretary, Royal Naval Bird Watching Society.*

PUBLICATIONS REVIEWED

Part 10 of the Birds of North and Middle America (U.S. Nat. Mus. Bull. 50, pt. x, 1946 [rec'd January 15, 1947], xii + 484 pp., 28 figs., \$1.25) covers the Galliformes, following the style and plan of earlier volumes of this work and particularly part 9. Friedmann has used many of Ridgway's notes and diagnoses, yet is responsible for the contents of the volume and should be regarded as the author. Indeed, we wish he felt less constrained to follow the pattern of Ridgway's earlier treatment; although uniformity has merit, its values diminish after the lapse of 45 years, the period since the initiation of the series. In the matter of form, we do appreciate the helpful inclusion in the keys of brief indications of ranges of species and subspecies (oddly omitted in some genera of the Cracidae).

One great value in such a compilation lies in the bibliographic material. Titles are listed for 1943, and at least some for early 1944. There is included a number of recently described races of galliforms, additional to those in Peters (Birds World, vol. 2, 1934) and in Hellmayr and Conover (Cat. Birds Amer., pt. 1, 1942), but only part of these seem to have been critically evaluated. In fact there is a tendency here and there to accept a form merely if it has not been clearly disproved as a distinct racial entity rather than place the burden of proof upon those who would advocate its recognition. Thus *Canachites canadensis torridus* is listed, although Friedmann says his material does not bear out this race and Hellmayr and Conover (*op. cit.*:212) could give it no real support. Further, *Lophortyx californicus orecta*, although thought unworthy by several authors, is defended but weakly as follows: "The race is only faintly characterized, but in fresh material it is recognizable." The recognition of two different races of turkeys on the two slopes of the Sierra Madre Occidental of northern Mexico is a questionable decision. Turkeys range freely across the crest of these mountains, and the likelihood of them segregating there into two consistently characterized races is slight.

In the genus *Dendragapus*, although but one species is recognized formally, the arguments for two species are well reviewed and are stronger than those calling for one species; it may be

added that nowhere is an intergradation of the two species brought to light. In these grouse, there is reported an incongruous overlapping of the ranges of *sierrae* and *howardi*, the former extending south as far as Madera County, California, the latter extending north some fifty miles past Madera County to Calaveras County. These resident races in fact intergrade in the vicinity of latitude 37° on the west slopes of the Sierra Nevada over a fairly broad belt and arbitrary delimitation of range is necessary. To indicate that the ranges overlap distorts the picture and implies racial identification of individuals apart from the populations of which they are members.

There are a few errors of make-up in the volume which have been noted, the most disturbing of which is a transposition in the key on page 4 of the characters of the Cracidae and Phasianidae; the later text is correct. The name "Olathe Quail" is given to the California Quail of Owens Valley! Evidently this vernacular name was transposed from the account of the Gambel Quail of the race *sana* which has been provided with the new and sensible name of Colorado Gambel Quail. Such meaningful names indicating species affinity should have been provided throughout the work.

Surveys like the Ridgway series are by nature comprehensive rather than intensive. The taxonomic study of each small group cannot be complete nor wholly satisfying to the person particularly acquainted with a limited area or subject. Indication in this review of some points of doubt are not a reflection on the author of the work but rather an indication to the uninitiated that the analysis of variation and speciation in North and Middle American birds, and the taxonomy which reflects it, is far from being an exhausted field of endeavor. Friedmann is to be congratulated and thanked most warmly for bringing out this extremely useful and prevailingly accurate and dependable treatment of the Galliformes.—ALDEN H. MILLER.

COOPER CLUB MEETINGS

NORTHERN DIVISION

JANUARY.—The monthly meeting of the Northern Division of the Cooper Ornithological Club was held on January 23, 1947, in Room 2503, Life Sciences Building, University of California, Berkeley, with 153 members and guests present. Proposals for membership were as follows: Haven Hadley Spencer, Museum of Zoology, University of Michigan, Ann Arbor, Mich., by William H. Burt; Lawrence P. Richards, 5375 Kalanianaʻole Highway, Honolulu 49, Hawaii, by Harvey I. Fisher; Mrs. Roy F. Nelson, 650 Blair Ave., Piedmont 11, Calif., Miss Grace E. Ball, 1219 Leavenworth St., San Francisco 4, Calif., and Mrs. Luther Dunlap, 2817 Woolsey St., Berkeley 5,

Calif., by Junea W. Kelly; Albert E. Clattenburg, Jr., % Department of State, Washington 25, D.C., by C. V. Duff; Henry E. Childs, Jr., 2426 Bowditch St., Berkeley 4, Calif., by Waldo Mayhew; Mrs. Peggy B. Prince, % Reed Brainard, Artesia, New Mexico, by Lois C. Taylor; Thomas E. Bowman, Department of Zoology, University of California, Berkeley 4, Calif., and Dixon M. Woodbury, Department of Zoology, University of California, Berkeley 4, Calif., by Frank P. Filice; Dr. Victor Coles, Teachers College, University of Cincinnati, Cincinnati 21, Ohio, and Dr. A. R. Cahn, 190 East Pearson St., Chicago 11, Illinois, by Alden H. Miller; Miss Joan Kirk, 2188 Mountain Blvd., Oakland 11, Calif., and Mr. John H. Roush, Jr., 1675 Sweetwood Drive, Broadmoor Village, Colma 25, Calif., by Mrs. Harold C. Austin; William Nelson Donaldson, 5428 Hillside Rd., Richmond, Calif., John P. Earl, 148 W. Bissell, Richmond, Calif., Milton Hildebrand, 2409 Grove St., Apt. 1, Berkeley 4, Calif., Wallace Gibbs MacGregor, Jr., 1318 Shattuck Ave., Berkeley, Calif., Philip H. Kruttsch, 4125 Day Ave., Richmond, Calif., George E. Lawrence, 3131 College Ave., Berkeley 5, Calif., and Raphael R. Ronkin, Department of Zoology, University of California, Berkeley 4, Calif., by Charles G. Sibley.

Two proposals for honorary membership were read as follows: "Mrs. Hilda Wood Grinnell has been a member of the Cooper Ornithological Club since 1912, having become a life member in 1921. She has always taken an active part in the affairs of the Club, has given unsparingly of her time and energy as Secretary or Corresponding Secretary of the Northern Division since 1924, and has served as a member of the Board of Directors and as Assistant Secretary of the Corporation, and as a member of the Board of Governors. She has always had the best interests of the Club at heart and has done much to encourage the younger generation of members to carry on the aims and ideals set up by its founders.

"Therefore, be it Resolved, that Mrs. Hilda Wood Grinnell, in recognition of her years of service and loyalty, shall be elected an Honorary Member of the Cooper Ornithological Club." [signed] John McB. Robertson, W. Lee Chambers, Loye Miller, Hildegard Howard, Alden H. Miller, Charles Sibley.

"Joseph S. Dixon, a member of the Cooper Ornithological Club since 1904, now retired from the National Park Service, has done much to further the cause of conservation of natural resources and the preservation of our wild life as a heritage of all the people. As an outstanding field naturalist, he carried on research in the western United States and Alaska, under the auspices of the University of California and the National Park Service. He has published his findings largely in collaboration with other workers in his

chosen field and has always been generous in sharing his wealth of experience with others. His modest and friendly manner has brought him a host of friends.

"He served the Northern Division as Vice-president in 1910, and as President in 1924, and always gave generously of his knowledge and experience in helping to make the annual meeting and division meeting programs a success.

"Therefore, be it Resolved, that Joseph S. Dixon, in recognition of his achievement as a field naturalist, shall be elected an Honorary Member of the Cooper Ornithological Club." [signed] John McB. Robertson, W. Lee Chambers, Loye Miller, Hildegard Howard, Alden H. Miller, Charles Sibley.

The secretary brought to the Club's attention the announced plans for the modification of the boundaries of the San Geronio Primitive Area in the San Bernardino National Forest. The changes are to be made in order to permit the development of the area for winter recreation. After discussion, the secretary was instructed by a unanimous vote of those present to write to the Chief Forester and to the Regional Forester urging that careful consideration of the proposed modifications and their effect on wild life in the area be taken into account before permitting any changes.

The chairman of the nominating committee, Dr. Robert C. Miller, presented the following slate of officers for nomination. Sumner C. Brooks, president; Frank A. Pitelka, vice-president; Charles G. Sibley, secretary. These nominees were elected by a vote of those present.

Mrs. Kelly reported Mountain Plover in considerable numbers between Los Baños and Coal-inga and White-tailed Kites at Sears Point on January 10, 1947, at Pacheco Pass on January 17, and at Moss Landing on January 19.

Mrs. Eric Reynolds, the speaker of the evening, showed motion pictures of southeastern birds.—CHARLES G. SIBLEY, *Secretary*.

FEBRUARY.—The monthly meeting of the Northern Division of the Cooper Ornithological Club was held on February 20, 1947, in Room 2503, Life Sciences Building, University of California, Berkeley; 80 members and guests were present. The following names were proposed for membership: Mrs. Mary E. Blayney, 2508 Benvenue Ave., Berkeley 4, Calif., by Hilda W. Grinnell; Mrs. Eloise R. Denniss, 1101 Hillview Road, Berkeley 8, Calif., by Eric Reynolds; Mrs. C. J. Lunsford, 1772 Spruce St., Berkeley 9, Calif., by Mrs. R. F. Leavens; Wallace Hughes, Game and Fish Commission, State Capitol, Oklahoma City, Okla., Mrs. May F. Butler, John Day, Oregon, Paul Cecil Bibbee, 510 Dryden Road, Ithaca, N.Y., Louise Hering, Biology Dept., University of Colorado, Boulder, Colo., and Peter Kebless, 162 Van Winkle Ave., Garfield, New

Jersey, by Alden H. Miller; Brig. Gen. B. G. Chynoweth, 832 San Luis Road, Berkeley 7, Calif., Mrs. Arthur E. Gordon, 1645 La Loma, Berkeley 9, Calif., and Rachel A. Weckerle, 955 Fresno Ave., Berkeley 7, Calif., by Charles G. Sibley. The Northern Division voted unanimously in favor of electing Hilda Wood Grinnell and Joseph S. Dixon to Honorary Membership in the Cooper Ornithological Club.

Mrs. Grinnell called the Club's attention to the availability of a "List of the Birds of the Monterey Peninsula" recently published by the Monterey Peninsula Audubon Society.

John Davis reported 70 Sandhill Cranes at Los Baños. Junea Kelly reported 4 male and 4 female Hooded Mergansers on Phoenix Lake and an Allen Hummingbird at Ross on February 15. She observed 200 California Murres and a Pigeon Hawk at Point Reyes on February 18. Joe Marshall observed a Red-shouldered Hawk at Bolinas on February 16. Charles Sibley reported Harlequin Ducks at Tomales Point on February 14.

The speaker of the evening, Seth B. Benson, told of a trip to the Sweetwater Mountains of Mono County, California. Ward C. Russell supplemented Dr. Benson's talk with an account of an unusual sapsucker nest.—CHARLES G. SIBLEY, *Secretary*.

MARCH.—The monthly meeting of the Northern Division of the Cooper Ornithological Club was held on March 27, 1947, in Room 2503, Life Sciences Building, University of California, Berkeley; 175 members and guests were present. The following names were proposed for membership: Albert L. Wilk, R. R. 2, Camrose, Alberta, Canada, by Keith Dixon; Richard F. Johnston, 778 Marsh St., San Luis Obispo, Calif., by Joe T. Marshall, Jr.; Walter R. Donaghho, 913 Alewa Drive, Honolulu, T.H., by Harvey I. Fisher; James G. Irving, Jr., 631 Albin St., Teaneck, New Jersey, by Grace Crowe; Aryan I. Roest, 4232 S. E. Cora St., Portland 6, Oregon, by Frank Pitelka; Miss A. L. C. Macvean Green, % Toronto General Trust Corp., Pender St., Vancouver, B.C., and Mrs. George C. Browne, 2435 Ivy Drive, Oakland 6, Calif., by Junea Kelly; Herbert P. Eichler, 2211 Andrews Ave., New York 53, N.Y., by Charles Sibley.

The speaker of the evening, Dorothy Dean Sheldon, presented several reels of colored motion pictures on the birds and scenery of Nevada.—CHARLES G. SIBLEY, *Secretary*.

SOUTHERN DIVISION

FEBRUARY.—The monthly meeting of the Southern Division of the Cooper Ornithological Club was held in Room 145, Allan Hancock Foundation, University of Southern California, Los Angeles, February 25, 1947, with 150 members and guests present. The following names were proposed for membership: Howard Thomas Odum,

Box 1019, Chapel Hill, N. C., Miss Virginia Armstrong, Musketaquid Rd., Concord, Mass., Sister Mercedes, 7505 W. Glenoaks Blvd., Cabrini Villa Academy, Burbank, Calif., Hubert F. Morris, 28 Glengowan Rd., Toronto 12, Ont., Canada, and Hal Holmes Harrison, 1102 Highland St., Tarentum, Pa., by C. V. Duff; Henry W. Isham, 460 Bellefontaine St., Pasadena, Calif., and Robert A. McCabe, 424 University Farm Place, Madison 5, Wis., by J. McB. Robertson; Wade Laidlaw Enoch, 323 Lucard St., Taft, Calif., and Carl Raymond Enoch, 323 Lucard St., Taft, Calif., by Dorothy E. Groner; Edward J. Foley, 300 Delaware Ave., Oak Ridge, Tenn., and Douglas Edward Wade, Office of The Naturalist, Dartmouth College, Hanover, New Hampshire, by W. Lee Chambers; Robert F. Mason, Jr., 614 E. Washington St., Orlando, Florida, by Wilson C. Hanna; and Mr. P. Barruel, 12 Rue Peclet, Paris XVe, France, by William H. Behle.

The Southern Division voted unanimously in favor of electing Hilda Wood Grinnell and Joseph S. Dixon to Honorary Membership in the Cooper Ornithological Club.

It was moved, seconded and unanimously carried that the resolution presented by I. D. Nokes be adopted as an expression of the Southern Division in the death of Howard P. Davis.

C. V. Duff reported briefly on the hearing held on February 19 in San Bernardino concerning changes in boundaries of the primitive area of Mt. San Geronio and suggested that the secretary be instructed to send a written communication to the proper authorities expressing the objections of the Southern Division to any changes in the present boundaries. It was so moved, seconded and unanimously carried.

Roland Case Ross spoke on "How Winter Affects Sierra Birds."—DOROTHY E. GRONER, *Secretary*.

MARCH.—The monthly meeting of the Southern Division of the Cooper Ornithological Club was held in Room 145, Allan Hancock Foundation, University of Southern California, Los Angeles, on March 25, 1947, with 125 members and guests present. The following names were proposed for membership: Wesley Batterson, Rt. 1, Box 29, Nehalem, Ore., and Kenneth M. Walker, 704 S. 15th St., Corvallis, Ore., by Alex Walker; L. Richard Mewaldt, Department of Zoology, Montana State University, Missoula, Mont., by Philip L. Wright; Eugene Elvin Cardiff, R.F.D. 1, Rialto, Calif., by Edmund C. Jaeger; and Malcolm John Lerch, R.D. 5, Penn Yan, N.Y., by C. V. Duff.

Arthur Berry reported the observation of a Fulmar inside the San Pedro breakwater on March 15.

Robert T. Moore spoke on "Collecting Stations in Tropical and Boreal Mexico."—DOROTHY E. GRONER, *Secretary*.

For Sale, Exchange and Want Column.—Each Cooper Club member is entitled to one advertising notice in any issue of *The Condor* free. Notices of over ten lines will be charged for at the rate of 15 cents per line. For this department, address JOHN MCB. ROBERTSON, Buena Park, California.

FOR SALE—The *Condor*, 1915 and 1916, complete; 1917, all but Nov.-Dec. issue; 1918 and 1919, complete; 1920, Jan.-Feb. only; 1924, complete and five issues without covers; 1932 through 1938, complete, all in good condition.—GEORGE MIKESCH SUTTON, *Museum of Zoology, University of Michigan, Ann Arbor, Michigan*.

WANTED—Bulletin of the Cooper Ornithological Club, vol. 1, nos. 3, 4 and 6. Name your price. JOHN DAVIS, *Museum of Vertebrate Zoology, Berkeley 4, California*.

FOR SALE—A complete file of *The Condor*, 48 volumes, with the exception of no. 3 of volume 1; to be sold as a unit; make offer.—JULES LABARTHE, *21 Plaza Drive, Berkeley 5, California*.

FOR SALE—Complete set of Bent's bulletins, 14 numbers, with original of no. 107, for \$120.00; or with reprint of no. 107, for \$85.00. Complete sets of Auk, *Condor*, Bird Lore, Wilson Bulletin, Journal of Mammalogy, Pacific Coast Avifauna, and odd numbers of Ridgway's Birds of North and Middle America. Liquidating, Bryant's Outdoor Heritage, \$1.10; Friedmann's Cowbirds, \$2.10; Log of Tanager Hill, a bird banding book, \$1.10.—F. M. DILLE, *822 Grand Ave., Nogales, Arizona*.

WANTED—The Auk, April, 1884; April, 1885; and January, 1889. Will pay good cash price, or desirable sets, including Richardson Pigeon Hawk, and other Alberta sets.—FRANK L. FARLEY, *Camrose, Alberta, Canada*.

FOR SALE—Dawson's bird books are rapidly becoming exceedingly rare. Dawson and Bowles' Birds of Washington, 2 vols., British Columbia Edition, no. 49 of an edition of 55 sets, \$50.00. Birds of California, 4 vols., Large Paper Edition De Luxe, \$80.00. Both in fine condition.—WALTER J. EYERDAM, *7531 19th Ave., N. E., Seattle, Washington*.

FOR SALE—During the past five years we have accumulated a large stock of slightly damaged *Condors* and recently this lot has been enriched by donations of nearly three complete files from some of our oldest members. Most of these *Condors* are clean but show more or less wear, and some are slightly rumpled. As long as they last we will postpay volumes at 1/2 off our regular printed prices.—W. LEE CHAMBERS, *Business Manager, Cooper Ornithological Club, Topanga, Calif.*

PREPARATION OF MANUSCRIPTS FOR THE CONDOR

Articles published in the Condor normally are written by members of the Cooper Ornithological Club. Practically all the Club's money goes into the magazine; no editor and no business manager receive any pay other than the satisfaction of doing a service worthily. The preparation of good copy by the author will contribute greatly to accuracy of published output, dispatch in handling, and economy of production.

To be acceptable for inclusion in the Condor, articles must not duplicate in any substantial way material that is published elsewhere. Any type of subject bearing on birds may be considered; but the geographic areas of primary concern are western North America, Central America, and the Pacific Basin. Manuscripts may be submitted to any one of the editors (see inside front cover for address). Proofs with edited manuscripts will be sent to authors, at which time reprints may be ordered.

In the interests of accuracy and economy, observe the following: do not duplicate data in text, tables, or charts; check citations to original sources and verify text references; quoted statements must be exact replicas of the original; preferably use vernacular names applicable to the entire avian species (for a guide in this regard, see "The Distribution of the Birds of California," *Pac. Coast Avif.* No. 27, 1944:5-34); in general, avoid subspecific vernaculars; insert scientific names for species but not the subspecific name except in taxonomic papers or where the race concerned has been critically determined by the author or his collaborators; revise the manuscript repeatedly to remove superfluous words and phrases, immaterial detail, and repetitious statements.

Note Condor style and usage. "General Articles" and the "Field and Study" items are set up in different form. Provide a concise, meaningful title, and, where needed, subtitles within the text. Footnotes are not used. The address line may serve to indicate institutional connection, and to it should be added the date of transmittal of the manuscript. Terminal bibliographies are desirable where five or more titles are to be cited; otherwise, the references may be included in the text. For bibliographic style, note closely the practices employed in recent volumes of the journal. A factual summary is recommended for longer papers.

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Illustrations.—Photographs should be glossy prints of good contrast. Make line drawings with India ink; plan linework and lettering for at least $\frac{1}{2}$ reduction; do not use typewritten labels on the face of the drawing. Provide typed legends on separate sheets.

Helpful references on writing: *Manual of Style*, University of Chicago Press, and *Rules of the Editorial Committee*, University of California Press. On scientific nomenclature: A.O.U. Check-list (with supplements 19, 20 and 21) and *Pacific Coast Avifauna* No. 27; authors are not required to follow either of these works.

THE EDITORS OF THE CONDOR.

